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Review Article

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CONCEPTUAL STUDY OF JUDICIOUS USE OF PIPPALI AS A BROADSPECTRUM ANTIBIOTIC IN VARIOUS CHEST INFECTIONS

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ABSTRACT

Recurrency in chest infections and its related resistance to various antibiotics pave a way to research through application of herbal medicines. Ayurvedic herbal drugs, their formulations are new area of research. Their antimicrobial properties have been analysed and *pippali* is amongst the various herbal drugs whose effects has been seen against various pathogens. As herbal medicines have greater safety profile they can be opted as the best form to fight resistant pathogens infecting chest. *Pippali* in ayurvedic text has been mentioned amongst the group of drugs used in chronic cough. Hence its judicious use if planned can serve a newer way to fight the culprit

pathogens which are about to the advent the human population for their resistant hazardous effect in future. Various ayurvedic text, electronic sources were studied for antimicrobial effect of *pippali* in various gram positive and gram negative bacteria. **Conclusion**: *Pippal*i having increased safety profile bioavailability enhancing capability, can be can be considered as best alternative for recurrent chest infections if used judiciously.

KEYWORDS: *Piperine*, antimicrobial, bioavalability enhancer, judicious, resistance.

INTRODUCTION

Antibiotics are considered as a "wonder drug" in combating various pathogenic bacteria. Uncertainty has arisen as microbes have become resistant to common antibiotics. A growing list of chest infections like pneumonia, pulmonary tuberculosis, bronchitis, asthma become harder sometimes impossible to treat due alarming growth of resistant species. Unjudicious use of antibiotics that is undue or overuse of antibiotics in the population develops the resistant species of microbes. Challenges to deal with the natural genetic tendency of pathogenic microbes to develop resistance to frequently used antibiotics give a new horizon in discovering antimicrobial agents from the treasure of ayurvedic herbs. Studies in this direction have been carried out to find the volatile extract from herbs which can act as an antibiotic in fighting various recurrent chest infections. Pippali is one amongst the various magical ayurvedic herbs. Pippali can act as a saviour with its potential of showing antimicrobial affect on gram positive and gram negative bacteria. It can act as prophylactic as well as preventive medicine in various chest infections. It can be one of the wonder drug if used judiciously. *Pippali* can be thought to protect humans from the havoc of resistant species which are main culprits in causing chest infections. Herbal medicines with higher safety profile and better efficacy are actually need of hour. Pippali in ayurvedic text is considered deepan, pachan, shwashar. Piper longum(family piperaceae) is a slender, aromatic climber with perrinial woody roots, occurring in hotter parts of India from central Himalaya to Assam and in south india. The fruit is blackish and root which is thick branched of *piper longum* has said to be of medicinal value. It acts as a stimulant, laxative, carminative, given in chest infections, dyspepsia, chronic cough, enlargement of spleen and other viscera, gout and lumbago. Pharmacological profile shows that plant acts antimicrobial, antitubercular, neuroprotective, hepatoprotective, respiratory, anti diabetic and an aphrodisiac along with bioavailability enhancer. The above mentioned actions of plant occur due to five basic ayurvedic pharmacological properties that is (ras, veerya, vipak, guna and prabhav) along with several phytoconstituents. Pippali fruit contains volatile oil such as piperlogumine, piperidine, piperine. This review article is an attempt to review the antimicrobial property of *pippali* along with conceptualising the proper use of it as an broad spectrum antibiotic in various chest infections.

Aim

Use of *pippali* as a broad spectrum antibiotic in various chest infections.

Objectives

Reviewing various literature related to *pippali*, its antibacterial property. Conceptualising use of *pippali* in chest infections taking above references.

MATERIALS AND METHODS

Various ayurvedic text and electronic review articles of study of antimicrobial property of *pippali* studied, critically analysed. Taking base of ayurvedic text and references of the the antibacterial property of *pippali* a study has been design to conceptualise the judicious use of *pippali* in various chest infections.

Literature review

Colonisation of the upper airway is often thought to be primary step in the development of any chest infections like pneumonia. The lower respiratory tract is usually sterile but can often get colonised by acute illness *with pseudomonas streptococcus, klebsiella, staphyllococus aureus, escheria coli* and many such microbes. This often characterises advancing COPD and cystic fibrosis. Chronic colonisation results in inflammation and further increases bacterial adherence. This results in vicious cycle of inflammation, infection and bronchial alveolar damages. Increasing use of antibiotics has been shown to increase risk of resistant bacterial species. This vicious cycle and growing resistant group of bacteria pave new way for thinking an alternative with higher efficacy and safety profile. Going through the vast range of herbal drugs *pippali* is found to show its antimicrobial property in fighting various gram positive and gram negative group which are actually main culprit in causing various chest infections.

Reviewing remedial properties of pippali

Pipplali in ayurvedic text has been mentioned with special actions like it acts as *vrishya*(aphrodisiac), *rasayani*(rejuvenating), *rechani*(purgative) and alleviator of kaph and vayu (two mentioned ayurvedic dosha responsible for related diseases). In its therapeutic usage it has been mentioned that it cures *shwas*(dyspnoea), *kaas*(cough), *udar*(obstinate abdominal disease along with ascites), *jwar*(fever), *kushta*(obstinate skin disease including leprosy), *prameh*(obstinate urinary diseases including diabetes), *arsha*(piles), *pleeha*(spleenic disorders), *shool*(colic pain) and *amavata*(rheumatism). *Pippali is* said to have two diverse

properties as per their types that means in wet form it is said to aggravate *kaph dosha* where as it its dried form helps to alleviate *kaph* and *meda* which actually acts the remedial property in *shwas, kaas rogas*. And even in medicinal purpose the dried form of *pippali* is used. *Pippali* is said to be one of the best remedial herb *jeerna jwar*(chronic fever) which in todays prospective we correlate it with long standing fever caused by bacterial innervations. Some prospective it gives a directive of treating fever caused by hidden pathogens. It has been documented that *gudpippali yog*(a preparative combination of jiggery and pippali powder) works well as carmative and antipyretic effect in long standing fever. Various ayurvedic preparation contains *pippali* as it is said to be the best bio availability enhancers.

Role of Pippali on bioavailability of drugs

Pippali in *charak samhita* is known for its *yogvahi guna* which can be looked as an bioavailability enhancer. That means pippali when combined with either combination of herbs enhances the property as compared to the single use of it. *Piperine* has been shown to enhance the bioavailability of structurally and theurapitacally diverse drug possibly by modulating membrane dyanamics due to its easy participation and increasing permeability. The study has been reported that *trikatu* (a combination drug of long pepper, ginger, black pepper) increases their bioavailability either by promoting rapid absorption of gastrointestinal tract or by protecting the drug being metabolised its first pass effect through liver after being absorbed or by combination of both of above said mechanism. This gives scientific validation of the *yogvahi* effect of pippali vis a vis as a bioavailability enhancer.

Antimicrobial effect of pippali

The isolated protein of *pippali* were screened for its antibacterial property. This was confirmed by inhibitory effect on bacterial growth as reflected by inhibition zone compared to known antibiotics. Suspension of various bacterias *as escheria coli, klebsiella pneumonia, proteus vulgaris, pseudomonas, salmonella, streptococcus, staphylococcus aureus, vibrio* cholera were tested against positive control group of streptomycin. The MIC values of piper *longum* proteins against selected bacterial strains showed good result as an antibacterial agent. It has been experimentally proved that *pippali* is effective in lower concentration and shows broad spectrum antibacterial activities with non toxic effects.

Judicious use of pippali

Considering the diverse property of *pippali* as mentioned in the text it also has been well documented that *pipalli* is amongst the drugs which needs judicious application. *Pippali*

kshar(alkali) and *lavan* (salty) are three substances which are described to be used in judicious form that implies in less quantity. It has been said that if *pippali* used in lesser amount considering the constitution of person, time, environment and nature of disease shows its miraculous effect. But if used in excess it results in accumulation of doshas. It aggravates *kaph dosha* if used for long time and with its *ushna guna* (hot potency) it also results in aggravation of pitta dosha. It has been said to have *yogvahi* effects hence never to be used alone. Similar effect has been experimentally proven the bioavailability effect of *pippali* in *trikatu as* explained earlier. Hence *pippali* is seen in various ayurvedic formulation in combined form which shows miraculous effect for example *sitopladi churna, jwaraghna kashaya*.

Pippali with its rasayan effect

Amongst the exceptions of long term use of *pippali*, its use as *rasayan*(immune modulator) is accepted. Various archaryas has explained the use of rasayan considering the variation of season, constituent of patient, the accumulation and domination of *doshas* in particular patient. For its best effect use of pippali in powder form, linctus form has been mentioned along with its anupan (vehicle to carry the drug). Vardhman rasayan is a procedure of administrating certain herbs in gradually increased doses and later tapered to beginning at end of procedure. Rasayan aims as enriching the quality of dhatus(tissues) with active components of herb. This strengthens them structurally and functionally. For this to happen large quantity of a particular herb needs to be administered but not in one shot. Hence the gradual increase is recommended to gradually load the tissue with the medicinal properties. Vardhman pippali is one such process where pippali is used in similar pattern of gradual increase and decrease in quantity of drug. This long pepper can be used in powdered, paste or decoction form. Whole fruit is also used in milk with increasing order considering the constitution of patient and accumulation of doshas. Various principle of increasing order has been documented. Use of vardhaman pippali rasayan with 10,6,3 pippali(increasing the order starting with either number can be hypothetically thought to fight the resistant problem of various microbes. This form use of *pippali* is thought to fight *kaas*(cough), *shwas*(lung diseases) and various other disorders. Vardhaman pippali rasayan(increasing and tapering order) is also amongst the various long term use of *pippali* and if conceptualised that the microbes if given a chance of facing the effect of *piperine* in increasing order can really solve the problem of resistance. As this method will make microbes to expose themselves to

different concentration of the drug making it possible to completely combat the resistant species. It can again be thought of being an immunomodulator in various lung diseases.

DISCUSSION AND CONCLUSION

Considering the need of hour to face the disastrous effect of resistant antibiotics and increasing number of respiratory disorders amongst all age groups, *pippali* with its antimicrobial effects against most common species like *as escheria coli, proteus, pseudomonas, salmonella, streptococcus, staphylococcus aureus, vibrio cholera can searve as a saviour.* Going through all experiments documented and ayurvedic text dealing with the properties of *pippali* as single drug, as a *rasayan* and bioavailability enhancer gives a clear picture of *pippali*'s judicious use. This study gives a chance of filling the research gap of using *pippali* as a broad spectrum antibiotic in various recurrent chest infection. Advocating the use of vardhman pippali rasayan as one of the best remedial step that can prove potent against resistant group, a study can be conducted with this regards.

Further scope of study

Keeping in mind the ayurvedic benefits and its role in combating bacteria various interventional study can be carried out by deciding doses, duration of application of pippali churna, its combination drugs in various chest infections. Also *pippali's* immunomodulating action can be equally studied in various lung diseases. Ayurveda is a treasure house and its herbal drugs has a multifactorial effects in wide range of diseases. Interventional evidence based medicine shall set a new horizon for ayurvedic herbs in future.

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