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Review Article

ANTIOXIDANT AND ANTI-INFLAMMATORY EFFECT OF *SUNTHI* IN *PRANVAHA SROTAS*

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KEYWORDS: *Zingiber offcinale*, Anti-oxidant, Anti-inflammatory, Free radicals, Ketone body.

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ABSTRACT

Ginger, (*Zingiber officinale* Roscoe) is one of the important medicinal plants which is being used in Ayurveda from the ancient time. *Zingiber officinale* is well known as a health promoting. It has been an important ingredient in Ayurvedic, Chinese, and Tibb-Unani herbal medicines. In ancient culture medical practitioners focused on herbals for the promoting the immune system of body. Ginger has been identified as prostaglandin synthesis suppressor through inhibition of cyclooxygenase-1 and cyclooxygenase-2 and apart from its medicinal properties ginger can also be used as an antioxidant supplement. It has also anti-oxidant, anti-inflammatory, anti bacterial, immune modulator, anticancer, anti-diabetic and several properties. It has a rich phytochemical compound like *Gingeral, Shogaol, Zingerene*. In *Pranavaha srotas* anti-inflammatory effect is very useful to treat the disease Ginger inhibits the production of free radicals like ketone body $\{H^+,OH^-\}$, Lactic acid, uric acid intermediated product which is leading cause of DNA damage and various disease. Ethenol extract of *Z.officinale* alone with vit-E induced the nephro toxicity and Acetaminophen induced liver cell damage. Studies have shown that, the long term dietary intake of ginger has hypoglycaemic and hypolipidaemic effect It can reduced the muscle pain after physical activity, valuable ingredients which can prevent various cancer's angiogenesis and metastasis induction of apoptosis and inhibit of cell-cycle progression and used in the cardiovascular system, Diabetes mellitus and Gastrointestinal rheumatism, cough, coryza and bronchitis disease. Aim of this article to provide knowledge about Anti-oxidant and Anti-inflammatory properties of *Zingiber officinalis.*

INTRODUCTION

Pranvaha srotas considered as Respiratory system. It's main function is concerned with *Ucchwas* (Expiration) and *Nishwas* (Inspiration)[1]. Through the *Pranvaha srotas* is *Hrdaya* and *Mahasrotas*, *Hridya, Phupphusa* and *Rasavahi Dhamnis* are also *Mula* of *Rasavaha srotas*. According to *Ayurveda Dhatu kshaya, Vegadharana, Vyayama, Ruksha Aahara-Vihara* are causes of *Pranavaha srotas Vyadhi*[2]. hence it is convenient to discuss heart and its related disorders under Respiratory system[1]. The drug *"Shunthi" Zingiber officinalis* belongs to the family of Zingibraceae. The health promoting perspective of Ginger is attributed to its rich volatile and non-volatile substance. Volatile including sesquiterpene and monoterpenoid hydrocarbons providing the distinct aroma and taste of Ginger. Non-volatile pungent compound including Gingorol's, Shogaol's, Paradols and Zingerone. It also has anti-inflammatory and anti-oxidant properties for controlling the process of aging also anti-microbial potential. *Shunthi* prevent the formation of intermediate product like Lactic acid, uric acid, ketone bodies [3] helps to treat the infectious disease [2]. All the above properties are useful in Respiratory Disease as well as several number of disease like Heart disease, Neuro degenerative disease, Cancer. The bioactive of Ginger like Gingerol have show anti-oxidant activity in various modules.

AIM & OBJECTIVES

(1) To study the Anti-inflammatory and Anti-oxidant properties of Ginger.

(2) To study about the role of Ginger in *Pranvaha Srotas.*

Respiratory System[5]

Respiration in the process by which oxygen is the taken in and carbon dioxide is given out. The first breath takes place only after birth. Fetal lungs are non-functional So, during intrauterine life the exchange of gases between fetal blood and mother's blood occurs through placenta.[5] After the first breath, the respiratory process continues throughout the life Permanent stoppage of respiratory occurs only at death.

Respiratory Rate at Different Age[5]

New born :- 30 to 60/sec.

Early child :- 20 to 40/sec.

Late child :- 15 to 25/sec.

Adult: 12 to 16/sec.

Types of Respiration[5]

Respiration is classified into two parts

(1) External respiration: That involves exchange of respiratory gases, i.e., Oxygen and Carbon dioxide between lungs and blood.

(2) Internal respiration: Which involves exchange of gases between blood and tissue.

Classification of Respiratory Tract

Respiratory Tract

According to organ

Upper respiratory Tract
- a) Nose
- b) Nasopharynx
- c) Oropharynx
- d) Larynx
- e) Trachea

Lower respiratory Tract
- a) Lung parenchyma
- b) Bronchus

According to Diseases

Upper respiratory tract
- (a) Common cold
- (b) Allergic rhinitis
- (c) Sinusitis
- (d) Tonsillitis
- (e) Laryngitis, Pharyngitis

Lower respiratory Tract
- (a) Pneumonia
- (b) Asthma
- (c) Bronchitis
- (d) Lung abscess
- (e) Emphysema
- (f) Bronchiectasis
- (g) Occupational disorder

Phase of Respiration[6]: Respiration occur in two phases.

(1) Inspiration: During which air enter the lungs from atmosphere.

(2) Expiration: During which air leave the lungs.

During normal breathing, inspiration is an active process and expiration is a passive process.

Pathology[7]: Pathology of the respiratory system is divided into following parts :-

(A)Mucous Gland: Due to chronic irritation, mucous glands undergo hypertrophy which is main pathology finding in *Pranvaha Srotas Vyadhi*. The ration between the thickness of gland and thickness of the bronchial wall is called Reid index. this is normally 0.26 and in disease it become 0.59. This is the diagnostic feature.

(B)Goblet cells: In the bronchioles Goblet cells proliferate and are over distended with mucous. Goblet cells are responsible for the airway obstruction. Thus there are wheeze, ronchi and breathlessness.

(C)Mucous: Mucous secretion is enormously increase due to hypertrophy of mucous and proliferation of Goblet cells. This is cause chronic cough & sputum.

(D)Infection: Increased mucous predisposes to infection by various organism- *H.influenzae, S.pneumonia*. This leads to severe inflammation of the bronchial tree resulting in muco purulent sputum

Drug Review: *Sunthi* [8, 9]

No.	Drug	Botanical name	*Rasa-Panchaka*	Pharmacological activity
01	***Shunthi***	*Zingiber officinale* Rosc. **Family -** Zingiberaceae	*Rasa – Katu* *Guna – Laghu, Snigdha* *Veerya- Ushana* *Vipak - Madhura*	*Kapha-vatashamak, Shothhara, Vednasthapana, Deepan-Pachan, Shoolprashmana, Kaphaghana, Swashahara, Strotoshodhaka*

Chemical Composition [8]

The rhizome contain essential oils: alpha-Zingiberane, beta-bisabolene, 1,8-cineole, camphene, alpha- phellandrene, sesquiphellandrane, alpha-curcumene; pungentconstituent: 6-,4-,8-,10-,12-gingerols, 6-gingerdion, 6-shagaol, 8shagoal, 6-gingediol-3-aceta, 6-gingediol, 5-acetate, 6-gingediol-3-acetate, 6-gingediacetate.

Percentage of vitamin in *Shunthi* powder: Thiamine – 0.035%, Riboflavin-0.015%, Niacin- 0.045%, Pyridoxin-0.056%, Vitamin C-44%, Vitamin A- Traces, Vitamin E-Trace, Total – 44.15%[12]

Pharmaceutical Activity of *Shunthi*:- Antimicrobial, Anti-inflammatory, Antioxidant and immune modulatory role.

Mode of Action

(1) Anti-Oxidative Effect [4]

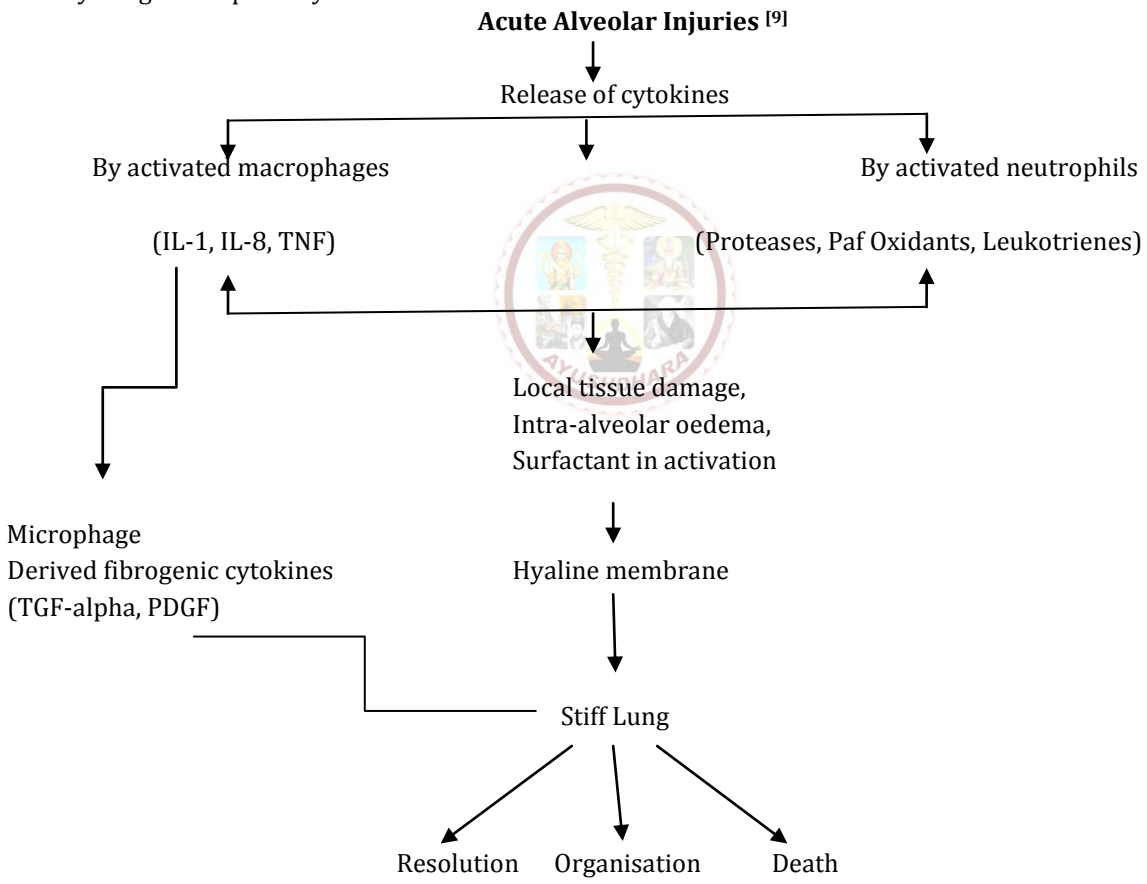
In *Sunthi* (*Zingiber officinalis*) has a rich phytochemical compound that scavenge free radicals

{H^+,OH^-, Uric acid, Lactic acid} produced. In biological system for the purpose of energy production but some free radicals which generated during the process of oxidation are essential. In advanced production of free radicals result in oxidative stress that can lead to DNA damage. The Anti-oxidative properties of Ginger is undoubtedly protect human against many chronic disease. 6-Shagaol has exhibited the most potent anti-oxidant and anti-inflammatory properties in Ginger which can be attributed to the presence of alpha, beta unsaturated Ketone moiety. Extract of *Zingiber officinalis*. Ethanol & Acetaminophen. In Ethanol combination of vitamin-E this is protection is mediated by Renal anti-oxidant defence And Acetaminophen induced liver damage so it is also useful in preventing Acute liver injuries. Particularly fresh Ginger methanol extract of drug were found to have better antioxidant action then the n-hexane extract.

(2) Anti-Inflammatory [4]

Zingiber officinalis is non-steroidal anti-inflammatory drug[12] Respiratory tract is the anatomical structure through which air moves in and out. It includes nose, pharynx, Larynx, trachea, bronchus and lung's. Main pathology of Respiratory tract is that inflammation in inner epithalial layer of Nose, Larynx, Pharynx, trachea, bronchus, Lung's. Gingeral, Shogaol and other structurally related substance in Ginger inhibit prostaglandin and leukotrine biosynthesis through suppression of 5-lipoxygenase. They can also inhibit synthesis of pro inflammatory cytokines such as IL-1, TNF-alpha and IL_8. Shagoal can down regulate inflammatory iNOS and COX-2 gene expression. Rhizome hexane fraction extract of *Zingiber officinalis* inhibited the excessive production of NO, PGE, TNF-alpha and IL-beta because of patent compound in Ginger rhizome for inhibiting Allergic reaction. It may be useful for the treatment and prevention of Allergic disease.

Antimicrobial Action: *Zingiber officinale* rhizome afforded three lipophilic analogues 6-gingerol, 8-gingerol and 10-gingerol that exhibited antimicrobial activity. The lipophilic analogues(8-gengerol and 10-gingerol) were more active [12].



Investigation of Respiratory System [10]

- Digital Chest radiography
- CT scanning
- High resolution CT scanning
- Ultrasound
- MRI
- Pulmonary Function Test [7]
- Blood test [7]
- Bacteriological culture sputum [7]

Contra-Indication [8]

a) *Kustha*
b) *Pandu*
c) *Mutrakricha*
d) *Raktapitta*
e) *Vrana*
f) *Jwara*

DISCUSSION

Zingiber officinalis are well known as a Health-promoting perspective. It has *Laghu, Snigdh Guna. Katu-Rasa, Madhur- Vipak* and *Ushana-Veerya.* Due to its *Veerya* it is *Kapha-vatashamak* and anti-inflammatory property. It has a anti-bacterial property so in condition of infection *Shunthi* is help to treat the disease. According to *Acharya charak* mentioned in *Harit varga*- and it's used in appetizer & *Vata-kapha vyadhi*.[13] also *Astrang Hridaya* mentioned in *Aaushadha Varga* which has a property like *Jatharagni Vardhaka, Veerya Vardhaka, Hridhaya, Strotoshodhaka & Kapha Vata Shamak*.[14] As well as useful in Kidney disease, liver disorder, Muscular pain, Cardio-vascular diseases, Diabetes-mellitus, Gastrointestinal tract system. ingredients which can prevent various cancer's angiogenesis and metastasis induction of apoptosis and inhibit of cell-cycle progression. It is very much useful to metabolized the free radicals which are responsible for all kind of respiratory system disease, DNA damage and play important role to inhibit the formation of intermediated product like Fee radical (H^+, OH^-), lactic acid, uric acid and ketone bodies in blood stream.

CONCLUSION

Shunthi is a specially use in *Vata-Kapha vyadhi*, it's a very good *Aama pachaka, Kaphaghana, Vatahara* drug, Due to its *Ushana veerya* useful for all kind of pain, Due to its *Kaphaghana* properties frequently used in *Swasha, Kasa, Pratishayay* and others respiratory disease. According to modern text pathology in respiratory is over production of mucus, proliferation of goblet cells, infections these are the common pathology in every *Pranvaha Srotasa Vyadhi* and all the properties which is mentioned above about *Shunthi* they are very much helpful to treat the disease especially n-hexane this is the substance which is highly anti-oxidant property and lipophilic analogues 6-gingerol, 8-gingerol and 10-gingerol that exhibited antimicrobial activity. as well as act as a bronchodilator. So according to all above properties *Shunthi* is play a effective roll in *Pranavaha Srotas Vyadhi*.

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