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PRACTICAL UTILITY OF "GILOY KWATH" AND "AYUSH KWATH" IN THE MANAGEMENT OF COVID-19 INFECTION-RELATED SYMPTOMS

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ABSTRACT

The SARS-CoV-2 virus is the infectious disease known as coronavirus disease (COVID-19). SARS-CoV-2 severe acute respiratory syndrome has developed into a pandemic. Being a novel virus, the pathogenesis of the disease causation is not fully understood, and drugs against this virus are still being tested, Consequently, there isn't an effective treatment at the moment. The research finding suggests that many Ayurved herbal drugs possess immune-modulatory, anti-inflammatory, and antiviral properties can be a turning point in the prevention and management of COVID-19. Reviewing the role of immunity in the pathogenesis of COVID-19, as well as '*Giloy kwath*' and '*Ayush Kwath*' significance in combating the virus and the regulation of immunity, is our intent in this literature study. The current review was carried out using a search of the available literature on COVID-19 and immunity, Ayurveda and COVID-19, *Vyadhikshamatwa*, *Rasayana*, and immunomodulatory effects of medicinal plants, including *Guduchi* (*Tinospora cordifolia Willd*.) *Sunthi*/Ginger(*Zingiber officinale Rosc*.), *Marich*/Black Pepper/(Piper nigrum Linn.), *Dalchini* (*Cinnamomum zeylanicum Breyn*.) and *Tulsi*/Holy Basil(*Ocimum sanctum Linn*.). Since ancient times, ayurveda and traditional remedies have significantly aided in the prevention and treatment of numerous communicable and noncommunicable diseases. Numerous therapeutic methods, such as *Rasayana*, *Satwawajaya*, *Yuktivyapashraya*, *Vyadhi Viparitarthakari chikitsa*, etc. can be used to accomplish *Guduchi kwath* and *Ayush Kwath* immune-promoting and disease-alleviating characteristics. *Guduchi kwath* as well as *Ayush Kwath* appears to be useful in regulating immunity for the prevention and mitigation of viral illness sequelae because of its antipyretic, antiviral, immune-modulatory, antioxidant, anti-inflammatory, anti-platelet, anti-atherosclerotic, hepatoprotective, and reno-protective qualities. The efficiency of these formulations must be confirmed via substantial biotechnological, pharmacological, and clinical research because there is insufficient data to establish their specific role against coronavirus.

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the pathogen responsible for coronavirus disease 2019 (COVID-19), has caused morbidity and mortality at an unprecedented scale globally.[1] The extensive spread of the coronavirus has resulted in a seriously detrimental effect on economic losses as well as physical and mental health. Scientific and clinical evidence is evolving on the subacute and long-term effects of COVID-19, which can affect multiple organ systems.[2] According to preliminary reports, the SARS-CoV-2 infection may still cause symptoms like fatigue, dyspnoea, chest pain, cognitive impairments, arthralgia, and a decrease in quality of life.[3-5] According to studies, these viruses can develop drug-resistant mutations that reduce the effectiveness of the currently available medications. Therefore, these viruses could be a long-term threat to humankind.[6] High mortality among persons with impaired immune systems and those who have underlying pathologies suggests that things that enhance immunity can stop serious COVID-19 infection-related symptoms.[7] In COVID-19 patients, comorbidities such as hypertension, diabetes mellitus, chronic obstructive pulmonary illnesses, and older age result in poor clinical outcomes; in these cases, preventative interventions are preferable to curative treatments.[8]

The finding that many herbal items contain immune-modulatory and antiviral properties can be a turning point in the prevention and management of COVID-19.[9] Ayurvedic interventions can be employed in COVID-19 for preventative, curative, and restorative approaches. *Ayush Kwath* and *Giloy Kwath* are herbal decoctions, which are currently used often for both preventative care and medicinal purposes. Additionally, the Ministry of AYUSH has released instructions for using Ayurvedic medicines to treat the infection. Hence, this study offers a descriptive description of the drug's pharmacological and clinical mechanisms.

THE IMMUNOPATHOLOGY OF COVID-19

It has been demonstrated that SARS-CoV-2 alters typical immune responses, impairing the immune system and causing uncontrolled inflammatory responses in COVID-19 patients who are severely ill and in critical condition. These patients exhibit granulocyte and monocyte abnormalities, high cytokine levels, lymphopenia, lymphocyte activation and dysfunction, high levels of immunoglobulin G (IgG), and an increase in total antibodies. These factors suggest that immunity plays a crucial role in the pathogenesis of COVID-19.

Lymphopenia

Patients with COVID-19 commonly exhibit lymphopenia, especially in severe cases.[10] Lymphocyte percentages were found to be lower than 20% in severe cases.[11] These findings suggest that lymphopenia can be utilized to assess the disease's severity and prognosis in COVID-19 patients.

Lymphocyte activation and dysfunction

Elevated exhaustion levels and reduced functional diversity of T cells may predict severe progression in patients with COVID-19.[12]

Abnormalities of granulocytes and monocytes

In COVID-19 patients, the number of granulocytes and monocytes is also abnormal. Neutrophils and the neutrophil-to-lymphocyte ratio—are usually important indicators for severe cases and poor clinical outcomes.[13]

Increased production of cytokines

Most severe COVID-19 cases exhibit an extreme increase in inflammatory cytokines, including IL-1β, IL-2, IL-6, IL-7, IL-8, IL-10, granulocyte-colony stimulating factor (G-CSF), granulocyte macrophage-colony stimulating factor (GM-CSF), interferon-inducible protein-10 (IP10), monocyte chemotactic protein 1 (MCP1), macrophage inflammation protein-1α, IFN-γ, and TNF-α, representing a "cytokine storm".[14]

Increased antibodies

The detection of SARS-CoV-2-specific antibodies (IgM and IgG) combined with nucleic acid assays provides the basis for COVID-19 diagnosis.[15]

COVID-19 ANALOGY IN AYURVEDA

DISEASE CONCEPT

Acharya Charaka in (*Vimansthan*, Chapter-3) explained these pandemic diseases as *Janapadodhwamsa* which means massive demolition or annihilation of people or community, and *Maraka* by *Acharya Sushruta*.[16] *Dalhana* in his commentary has mentioned that symptoms like anosmia, cough, and nasal discharge will occur after the entry of contaminated air through the nasal opening which is similar to typical clinical features of COVID-19 (*SutraSthana*, Chapter-6 verse 19–20).[17] Diseases of exogenous origin (*Agantuja Vyadhi*) initially develop without *Vataadi Dosha* involvement due to physical/external elements like *Bhuta*, *Visha*, *Vayu*, *Agni*, and *Prahara* (trauma), etc.; however, *Dosha* becomes engaged in the disease process later (C.S.Soo11/45). *Cakrapaṇidatta* clarifies that *Bhuta* means *Visakṛimi* or a virulent microbe (C.S.Sa.1/121); *Krimi* may be *Sahaja* (natural) or *Vaikarika* (pathogenic) creatures that may be visible (macroscopic) or invisible to the naked eye (microscopic) (C.S.Vi. 7/9,11). By interpreting the Covid illness according to *Samprapti*, taking into account the underlying cause and clinical features like fever (*Jwara*), cough (*Kasa*), anorexia (*Aruchi*), fatigue (*Tandra*), generalized body ache or myalgia (*Angamarda*), and tiredness, it can be considered of as an *Agantuka Vyadhi* which later develops into *Nija Vyadhi* as *Vata-Kapha-pradhana-sannipata-jvara* (fever involving all three *Dosha* with the dominance of *Vata-Kapha*) with *Pittanubandhatva* (in association with *Pitta Dosha*)[18] (C.S.Soo. 11/45; C.S.Chi. 3/92).

When discussing the Ayurvedic pathogenesis of fever, *Charaka* stated that when *Vataadi dosha*, whether it be alone or in *Sansrista* (two *Dosha*) or *Sannipataja* (all three *Dosha*), became aggravated, it entered *Amashaya* and mixed with *Rasa Dhatu*, obstructing *Rasavaha* and *Swedavaha Srotas* destroying *Agni*; *Agni* then spread out from its *Sthana* to whole over the body causing the febrile condition (C.S.Ni.1/20, 23, 26; C.S.Chi.3/129-132).

The responsible causative factors and methods of prevention regarding these pandemics are explained under the heading of *Janapadodhwamsa*. Further, *Dina-Charya* (daily regimens), *Hita –Ahara* (proper diet), and *Ritu- Charya* (seasonal regimens) are also explained as vital roles in the management of *Janapadodwamsa vikaras*. According to *Charaka*, though individual persons differ widely in physical health and vitality, they are collectively susceptible to devastating epidemics (known as *Janapadodwansa*) caused by an external factor that is *Bhutabhisangaja*- like covid virus.[19]

IMMUNITY CONCEPT IN AYURVEDA

Vyadhikshamatva (immunity) defines as the ability to prevent and arrest the progression of the disease for sustaining homeostasis.[20] Invoking the term *Vyadhikshamatwa*, *Charaka* asserts that not all unwholesome diets are equally destructive, not all doshas are equally potent, and not all people are capable of resisting diseases. Even unwholesome (unhealthy) food does not always result in sickness (C.S.Soo. 28/7). This shows that the immune system of the body is very important in the development of disease. This has been described by *Chakrapani* in two ways: as being opposed to the severity and virulence of disease (*Vyadhi Bala Virodhitva*) and as having the ability to restrict, contain, or bind the causes or contributing factors of disease (*Vyadhi Utpadaka Vibandhakatva*). In Ayurvedic literature, the natural inherent strength or force of the body which is responsible for health is termed as *Bala*. This *Bala* depends upon the well-being of *Dhatu*, *Prakruti*, *Desha*, *Kala*, and *Ojas*. *Bala* is classified into

three types – *Sahaja*, *Kalaja* and *Yukti Kruta*. Therefore, in Ayurveda, immunity can be viewed as *Vyadhikshamatwa* and *Oja*, depending on the *Agni*, *Dosha*, and *Dhatu* conditions.

Ayurveda the science of life deals with the *Manas* and *Sharira* in a holistic way that gives importance to preventive medicines (*Swasthasya Swastha Rakshanam*) than the curative way (*Athurasya Vikara Prashamanam*). The concept of *Vyadhikshamatva* or *Bala* (Immunity) is propagated by Ayurvedic science.[21] The key to remaining healthy and being protected from infections is enhancing or transforming *Vyadhikshamatva Bala* of the individual. It is the natural defense system of the body according to modern science. It can be correlated with the immune system, which plays an important role in maintaining optimum health and preventing susceptibility to infection.

Ayurveda explains two types of *Bheshaja* to fulfill these aspects; *Swasthasyorjaskara* (Strengthen the factors which maintain the health of a person) and *Artasya Roganuta* (medicines specific to ailments). *Swasthasyorjaskara Bheshaja* includes *Rasayana* and *Vajikarna Cikitsa*. The medicines used in these *Cikitsas* are mainly on plant-based modalities. They have high evidence of Immunomodulation activity along with various other pharmacological properties like antibacterial, antiviral, adaptogenic, etc. Enhancement of own immune system is the best course of treatment rather than being treated for the diseases. These attributes are similar to the modern concept of adaptogenic agents, which are known to afford protection of the human physiological system against diverse stressors.[22]

PATHOGENESIS OF COVID-19 AND POSSIBLE AYURVEDIC INTERVENTIONS

According to recent research, SARS-CoV-2 has a significant impact on the immune system through T cells, especially CD4+ and CD8+, which play a critical antiviral role in fighting infections[23]. However, it is associated with a risk of elevated immune response causing autoimmunity or inflammation[24]. To defend against viral infections like COVID-19, T helper (Th) cells produce pro-inflammatory cytokines through nuclear factor kappa-light-chain-enhancer of activated B cells (NF-kB) signalling.[25] In certain cases, there is an overactive immune response causing a serious inflammatory reaction causing apoptosis of host cell by the cascade of cytokine release leading to a life-threatening condition by cytokine release syndrome (CRS).[26] Coronavirus belongs to the family Coronaviridae which is further divided into four genera: alpha, beta, gamma, and delta coronavirus. In phylogenetic research, SARS-CoV-2 is closely related to beta-CoVs.[27] The genome of SARS-CoV-2 is composed of positive-sense single-stranded RNA [(+) ssRNA] with a 5′-cap,3′UTR poly(A) tail with embedded 14 open reading frames (ORFs), encoding non-structural proteins (NSPs) for virus replication and assembly processes; structural proteins including spike (S), envelope (E), membrane/ matrix (M) and nucleocapsid (N); and accessory protein.[28]

In addition to being powerful immune boosters or modulators, herbs with the capacity to affect virus receptors, their target sites, or interfere with the viral replication process can be employed as antivirals. Traditional medicines made from plants have been used for centuries. There is sufficient evidence to support the use of conventional drugs to treat viral infections by raising body immunity.[29] plants as a whole and through a range of metabolites can stop viral proliferation by controlling their adsorption, binding to host cell receptors, inhibiting the fusing of the virus into the host cell membrane, and influencing intracellular signals.[30] Similar to this, a pathogen protein's activity may be inhibited by a binding contract with a ligand produced from herbal extracts.[31] In Ayurveda, herbs that influence the immune system in either a direct or indirect way are referred to as immuno-herbs and fall under the broad category of *Rasayana*.[32]

It is possible that immunomodulators and immune adjuvants, which have also been linked to several *Rasayana* herbs, can play a significant part in the appropriate functioning of CD4+ and CD8+ cells. A few Ayurvedic *Rasayana* plants, such as *T. cordifolia* are known to boost the immune system by modulating the CD4+ and CD8+ T cells against viral infections.[33] As medicinal plants enhance NK cell activity, inhibit activated transcription factor 2 (ATF-2), down-regulate Th17-related cytokines including and Th2-related cytokines, inhibit GATA3, IL-4, IL-6, IL-1β, RORγt, IL-17A, TNF-α expression and increase the secretions of IL-10, INF-γ, etc, It demonstrates that natural products have strong immuno-modulatory and immune-boosting effects that could be beneficial throughout an infection by improving innate immune response to infections.[34-35]

AYUSH KWATH

For prevention of the disease progression to symptomatic and severed form and to improve recovery rate, *AYUSH Kwath* has been included in the National protocol Advisory of COVID 19.[36-37]

Ayush Kwath has the following contents in the proportion
(1) *Tulsi* (*O. sanctum Linn.)* leaves—2-3gms or 4 parts
(2) *Dalchini* (*C. zeylenicum Breyn*.) stem bark—1-3 gms or 2 parts
(3) *Sunthi* (*Z. officinale Roxb*.) rhizome—1-2gms or 2 parts
(4) *Krishna Marich* (*P. nigrum Linn.)* fruit—250mg-1gms or 1 part.

The dose of each herb is mentioned in API (The Ayurvedic Pharmacopoeia of India).[38] The Ayurvedic conceptual framework of drug action includes drug-related pharmacological properties, i.e., *Rasa* (taste),

Guna (quality), *Virya* (potency), *Vipaka* (transformed state after digestion), and *Prabhava* (action). Previous clinical studies suggested the following therapeutic and pharmacological characteristics of drugs of *Ayush Kwath* [Table 1]. The described formulation actively contributes to reversing the pathology at various stages.

TULSI

Tulsi, known as the "queen of all herbs", is used widely in Ayurvedic and naturopathic medicines which helps in the healing of the human body naturally. In addition to improving immunity, *Tulsi* is the plant that is most frequently found in Indian homes. It was revealed by another study that a larger concentration of linoleic acid in *O. sanctum L.* fixed oil aiding toward its antibacterial activity.[39] Due to its anti-inflammatory and antioxidant properties, it enhances the antioxidant enzymes, guards cellular organelles and membranes by removing damaging free radicals, and protects against harmful chemical-induced injury.[40] Numerous studies have shown that *Tulsi* (aqueous and methanol extract of leaf and seed oil) not only improves vital capacity but also is an immune-modulator and regulator as it enhances immune response by increasing T-helper and NK cells; phagocytic activity and index with the rise in lymphocyte count, neutrophil count and antibody titer.[41]

DALCHINI

The *C. zeylanicum* bark extract's anti-inflammatory properties were revealed in a clinical trial. The extract was found to prevent tumor necrosis factor (TNF).[42] Severe COVID-19 is accompanied by a cytokine storm, or an increase in proinflammatory cytokines such as interleukin (IL)-1, IL-6, TNF, and interferon in the blood. In a study it is revealed that oral administration of cinnamon water extract to mice significantly reduced serum levels of TNF- and IL-6.[43] One study found that cinnamon at a high dose (100 mg/kg) significantly enhanced the phagocytic index, serum immunoglobulin levels, and antibody titer, and decreased the percentage reductions in neutrophil count, demonstrating an immune-stimulant effect. Only serum immunoglobulin levels increased with a mild dose of cinnamon (10 mg/kg). This demonstrated that although low doses only affected humoral immunity, high doses increased both cell-mediated and humoral immunity.[44]

SUNTHI

The chemicals in *Z. officinale* known as shogaol and gingerol were shown to prevent the formation of leukotriene and prostaglandin. Additionally, they suppress the production of proinflammatory cytokines like TNF-, IL-1, and IL-8.[45-46] The drug may help in treating thrombotic conditions brought on by COVID-19 (which is a condition characterized by severe inflammation, platelet activation, endothelial dysfunction, and stasis)[47]. *Z. officinale* may be a therapeutic candidate in the Covid situation since it prevented viral replication inside of HCV-infected HepG2 cells.[48]

KRISHNA MARICH

The extract and its constituents like piperine, regulate the balance of cytokines production reduce the accumulation of inflammatory cells, inhibit the expressions of IL-4, IL-6, and TNF-a, and increase INF-g and IL-10 secretions in BALF (Broncho-alveolar lavage fluid) and increase macrophage activation and T and B cell proliferation.[49] The alkaloid derived from *P. nigrum* contains piperine, which contributes to antioxidant, anti-amoebic, anti-carcinogenic, anti-asthmatic, anti-inflammatory, and immunomodulatory effects. This has been demonstrated in several clinical and experimental research.[50] Besides this, *Marich* possesses cytotoxic activity, suppresses the levels of total IgE, and histamine release in serum and infiltration of inflammatory cells, and inhibits the allergic responses, and mast cells activation.[51-52]

GILOY KWATH

One of the most popular plants in Ayurveda is *Tinospora cordifolia (Willd.) Miers*, which is used to treat a variety of illnesses. In a study conducted on *T. cordifolia* found to possess immunomodulatory activity by improving the phagocyte function without affecting cell-mediated and humoral immune systems.[53] It was also reported to reduce pro-inflammatory mediators IL-1β, IL-6, IL-23, TNF-α and MIP-1[54]. Medication like *Samshamanivati*, which is made of an aqueous extract of *T. cordifolia*, is effective in various types of viral infections by cell-mediated immunity.[55] According to an in silico investigation, *T. cordifolia* secondary metabolites exhibit a significant affinity for blocking the SARS-CoV-2 major protease.[56]

DISCUSSION

Ayush Kwath and *Giloy Kwath* have both immune promoting and disease alleviating properties which can be achieved by various therapeutic approaches like *Rasayana*, *Satwawajaya*, *Yuktivyapashraya*, *Vyadhi Viparitarthakari Chikitsa*, etc. As per the Ayurvedic classical perspective, *Tikta Rasa, Katu Rasa, Usna Virya* and *Jvaraghna*, *Deepana*, *Pachana*, *Yakritduttejaka*, *Srotoshodhaka kapaha-shamaka*, *Raktashodhaka*, *Krimighna*, *Swasahara* properties of the constituents of Ayush *kwath* has a direct role to pacify various clinical signs, symptoms, and complications. It helps to improve *Agni* and *Srotosodhana* (improves microcirculation and tissue perforation); thus promotes proper digestion, metabolism, and absorption and acts as *Rasayana* for the development of preceding *Dhatu* and finally *Oja*. *Oja* itself functions as immunity to prevent disease. *Ayush Kwath* purifies the blood due to its *Raktashodhaka*, *Hridhya*, and *Krimighna* characteristics as well as its *Agni*-promoting and *Kaphashamaka* capabilities, that balance *Kapha*. The natural *Kapha* and pure blood promote *Oja* and *Bala* respectively. Due to its *Krimighna Prabhava* (special action) of *Tulsi* and *Sunthi*, it acts against pathogens.

As this disease is considered as *Kapha-Vatolvana Hina Pitta Sannipataja Jwara*, the *Kapha Vata Shamaka*

qualities of *Ayush Kwath* can play a significant role in balancing the vitiated *Doshas*. *Charaka* suggests the decoction of *Pachana* drugs in the case of *Amdosha* and *Shamaniya* drugs in the case of *Niramadosha* after six days of *Jwara*(C.Chi.3/160).[57] This demonstrates that *Yuktivyapashraya* and *Vyadhiviparita Chikitsa* are still effective even when *Dosha* is present. *Ayush Kwath* has potential psycho-neuro-immune mechanisms via evidence of a reduction in depression, anxiety, and stress; this shows the role of *Satvawajaya Chikitsa* in its management.[58]

Guduchi has the highest medicinal value of all the Ayurvedic plants. Ayurvedic pharmacodynamics of *Guduchi* unveils that it possesses *Tikta, Kashaya, Katu Rasa, Ushna Veerya*, and *Madhura Vipaka*, pacifies *Tridosha* and maximum indications are found for *Jvara*(Fever). The most important *Karma* attributed to *Guduchi* is *Rasayana* (rejuvenation), *Balya*(promoting strength), *Deepana/Vahnikrita* (digestive), *Amahara, Vayahsthapana*, and *Medhya* (promoting intellect). *Giloy* helps in reducing fever due to its *Javarghana* (antipyretic) property. According to Ayurveda, *Ama* and any external particles or germs are the two main causes of high fever. Due to its *Deepan* (appetizer) and *Pachan* (digestive) qualities, *Giloy* helps lower fever by enhancing digestion and absorption, which in turn reduces the production of *Ama*. Due to its *Rasayana* feature, it also strengthens immunity to combat foreign particles or organisms.

The majority of the plants covered in this article are inexpensive, readily available herbs that may be effectively used for enhancing non-specific immunity among individuals. Additionally, this may help to alleviate related symptoms and prevent co-infections. The host defense mechanism may be strengthened in this scenario. *Rasayana* herbs aid in developing non-specific immunity. NK cells participate in non-specific innate resistance, but they also contribute to adaptive immunity by promoting the development of antigen-specific Th1 cells by producing IFN- and IL-2. Viral neutralization is directly influenced by improved NK effector cell response [through IFN production and cytotoxic granule exocytosis][59]. Medicinal herbs with immune boosting characteristics can be an option during the early non-severe stage while herbs with anti-inflammatory and anti-thrombotic properties can be an option during a later or severe stage of covid. Cytokine storm, which is thought to be a key cause of COVID-19 complications and death Anti-inflammatory medications, such as steroids, IL-6 receptor antagonists, and anti-inflammatory interleukins (IL-10) has been reported to alleviate symptoms in patients.[60]

Research into cinnamon bark's ability to suppress INF-g and IL-4 as well as its anti-atherosclerotic, anti-coagulative, and anti-platelet activity can be a topic of research to reduce inflammatory and thrombotic complications in COVID-19 patients. To reduce cytokine storm in COVID-19 patients, *Sunthi*, because of its inhibitory effects on proinflammatory cytokines, and *Marich*, because of its ability to reduce the accumulation of inflammatory cells with controlled cytokine production balance, need to be investigated with the therapeutic trial. These herbs that have been reported to work as an immunity booster against other viral infections, and to possess anti-allergic/anti-inflammatory activities, need to be tested against COVID-19. *Ayush Kwath* should be administered taking into account the *Prakriti* and *Doshaawastha* of the ailments because it has qualities that enhance *Pitta dosha*; otherwise, it may result in *Raktadushti*.

CONCLUSION

Ayush Kwath and *Giloy Kwath* appear to be useful in regulating immunity for the prevention and mitigation of viral illness complications because of their antiviral, antipyretic, immune-modulatory, antioxidant, anti-inflammatory, anti-platelet, anti-atherosclerotic, hepatoprotective, and renoprotective qualities. Hence, there is a potential need to conduct comprehensive preclinical and clinical studies to explore the therapeutic effects and mechanism of action of these drugs.

Table 1: Contents and pharmacological action of A*YUSH KWATH*.

S.N	Name	Scientific name	Parts used	Main chemical constituents	*Rasa*	*Virya*	*Ayurvedic Dosha karma*	*Sansthanika Karma*	*Prabhava*
1.	*Tulsi*	*Ocimum sanctum Linn*	Leaves	Volatile oil (Phenol, Aldehyde), Eugenol, Ascorbic acid, Linoleic acid, Carotene	*Katu, Tikta*	*Ushna*	*Kaphavatashamaka Pittabardhaka*	*Vedanahara, Deepana, Pachana, Anulomana, Krimighna, Hridhya, Raktashodhaka, Kasahara, Swasahara, Kshayanashaka, Mutrala, Vishaghna, Jwaraghna esp. useful in Vatashlaishmika, Vishama and Jirna Jwara*	*Krimighna*
2.	*Dalchini*	*Cinnamomum zeylanicum Breyn.*	Stem Bark	Cinnamaldehyde, cuminaldehyde, Eugenol	*Katu, Tikta, Madhura*	*Ushna*	*Kaphavatashamaka Pitta vardhaka*	*Deepana, Pachana, Vajikarana, Vataanulomana, Yakridutejaka, Grahi, Hriyottejaka, Ojovardhaka, Raktashodhaka, Shelshmahara, Yakshmanashaka, Mutrajanana,*	
3.	*Sunthi*	*Zingiber officinale Rosc*	Rhizome	Zingiberene, Zingiberol	*Katu*	*Ushna*	*Kaphavatashamaka*	*Deepana, Pachana, Vrishya, Shoolaprashamana, Raktashodhaka, Hridhyottejaka, Shothahara, Kaphaghna, Swasahara, Jwaraghna, Aampachana*	*Krimighna*
4.	*Marich*	*Piper nigrum Linn.*	Fruit	Piperine, Piperidine, Piperettine and Chavicine	*Katu*	*Ushna*	*Kaphashamaka*	*Deepana, Pachana, Yakriduttejaka, Vatanulomana, Krimighna, Hriddhyottejaka, Kaphaghna, Kaphamissaraka, Jwaraghna, esp. Vishamjwara pratibandhaka.*	

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