



ISSN NO. 2320-5407

Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/12028
DOI URL: <http://dx.doi.org/10.21474/IJAR01/12028>



INTERNATIONAL JOURNAL OF
ADVANCED RESEARCH (IJAR)
ISSN 2320-5407
Journal Homepage: <http://www.journalijar.com>
Journal DOI: 10.21474/IJAR01

RESEARCH ARTICLE

SCOPE OF AYURVEDA IN PREVENTING COVID-19

Shah Nandini¹, Deepshikha² and Garg G.P³

1. PG Scholar, PG Dept. of Kaumarbritya, Uttarakhand Ayurveda University, Gurukul campus, Haridwar.
2. Assistant professor, PG Dept. of Kaumarbhritya, Uttarakhand Ayurveda University, Gurukul campus, Haridwar.
3. Professor and H.O.D., PG Dept. of Kaumarbhritya, Uttarakhand Ayurveda University, Gurukul campus, Haridwar.

Manuscript Info

Manuscript History

Received: 10 September 2020
Final Accepted: 15 October 2020
Published: November 2020

Key words:-

Ayurveda, Coronavirus, COVID-19,
Janpadodwansa, Traditional herbs

Abstract

The world is facing global pandemic coronavirus which causes severe acute respiratory syndrome (SARS-CoV-2) infection mainly affecting the immune system of the body. In a very short span of time it has become a global concern due to its high R0. Many countries are still endeavoring to prevent the disease. Researches are still underway to develop effective vaccine or drugs for COVID 19 disease. Unfortunately, there is no definite preventive or curative medicine available for coronavirus in allopathic system of medicine. As no specific drugs are available in mainstream medicine for treating symptoms of COVID-19, prevention seems to be the best strategy. The traditional health care system can prove to be successful for prophylaxis. Ayurveda is a medical science with well-established scientific principles, practiced in India for several thousands of years. Acharya Charak has explained the concept of Janpadodwansa which has a direct correlation with COVID pandemic. This article is an attempt to interpret direct correlation between pandemics and Janpadodwansa and provide viable options for COVID-19 prevention by Ayurvedic medicines like Guduchi, Ashwagandha, Yashtimadhu, Chayavanprash, Suwana prashan etc. and enhancing the immune system.

Copy Right, IJAR, 2020.. All rights reserved.

Introduction:-

The global pandemic SARS-CoV-2 has become a matter of concern. The outbreak started on 31st Dec 2019, when Chinese authorities reported that 41 people in Wuhan (most populous city in central china) had caught a mysterious pneumonia like virus. For some time the authorities did not report any new cases for several days. On January 13, WHO reported a case in Thailand, the first case outside China, in a woman who had arrived from Wuhan. On January 16, Japan's health ministry reported a confirmed case in a man who had also visited Wuhan. Since then the novel Corona virus has created a global threat. WHO declared this disease as pandemic on 11 march 2020¹. Since then the virus is continuously challenging the economy and health system across the globe. Many countries are still endeavoring to prevent the disease. In a very short period of time the virus has devastated the world economically, psychologically and socially.

Corresponding Author:- Shah Nandini

Address:- PG Scholar, PG Dept. of Kaumarbritya, Uttarakhand Ayurveda University, Gurukul campus, Haridwar.

Ministry of AYUSH issued an advisory note on a variety of immunity enhancing steps on 31 march 2020, with reference to Ayurvedic literature, to resist SARS-CoV-2 infection by enhancing the immune response of the body.² Ayurveda brings the hope in this scenario by giving herbs and preparations that can enhance the immunity power of an individual to fight diseases. This paper presents an overview on COVID-19, concept of epidemic as per Ayurveda and approach of Ayurveda in preventing and curing viral diseases like SARS-CoV-2. The article will help provide viable options for controlling COVID-19 by maintaining the immune system and reducing the symptoms and its drastic impacts by means of ayurvedic intervention modalities.

An Overview of COVID-19:

Corona viruses are single stranded, enveloped positive stranded RNA viruses. The name corona due to their characteristic crown like appearance seen in electron micrographs. These viruses have largest known viral RNA genomes. Phylogenetic and taxonomic analysis reveals that this virus is of same species as (SARS-CoVs) and designates it as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).³ SARS and MERS are both beta coronaviruses that cause severe respiratory syndrome in humans. According to international committee on taxonomy of viruses 4 of 9 Betacoronavirus species were identified only in bats. Thus, bats are likely the major natural reservoirs of Betacoronavirus. SARS-CoV-2 has more structural similarity with a bat coronavirus as compared to SARS-CoV. However, its spike (S) glycoprotein has 10-20 times higher affinity to human ACE2 receptors as compared to SARS-CoV, leading to more chances of human to human transmission, still having a lesser mortality rate than that of SARS and MERS.⁴ COVID-19 can spread from person to person via small droplets released during coughing or sneezing by a COVID positive patient.

Understanding the clinical features of COVID-19 is very important, although symptoms are indicated nonspecific. A person may experience COVID disease without any symptoms. Common symptoms include: Fever, cough, sneezing, myalgia, fatigue, sore throat, breathlessness, patients may also experience diarrhoea, vomiting and nausea. Older immunocompromised persons with comorbidities are more prone to corona virus.⁵

Till 22 sept, there were 31,497,547 confirmed cases of COVID-19 which includes 969,535 deaths with 23,132,398 recoveries around the world.⁶

WHO guidelines for prevention of COVID 19⁷:

1. Clean hands regularly and thoroughly with alcohol based sanitizer or wash them with soap and water
2. Maintain at least 1 metre distance between yourself and others
3. Avoid going to crowded places
4. Wear fabric masks
5. Avoid touching your mouth, eyes and nose
6. Follow good respiratory hygiene
7. Cover your mouth and nose with bent elbow or tissue while coughing and sneezing
8. Proper disposal of used tissues, masks or gloves
9. Self-isolation in case of minor symptoms
10. Seek medical attention in case of fever cough and difficulty in breathing

Concept of pandemic in Ayurveda and its treatment:

Pandemic is a disease outbreak prevalent over a whole country or the world. Knowledge about microorganisms and epidemics is also available in ayurvedic texts. Acharya Charak has described the concept of Janpadodhwansa in 3rd chapter of Vimana sthana, in which a large population is affected by a disease with similar symptoms at the same time. Janpadodhwansa occurs due to vitiation of Vayu, Jala, Desh, Kala.⁸ For any epidemic condition Acharya Charak has described Panchkarma (Cleansing and rejuvenating process for the body), Rasayana (Immunomodulatory drugs), Sadvritta chikitsa (Good conduct).⁹

Ashtang Sangrah opines that a person whose food, age, habits, favourable conditions and constitutions are all different, gets affected by same disease at the same time, caused by vitiation of air, water, land, season when they are exposed to it. The cause for such natural abnormalities is the sinful acts of the community.¹⁰

Acharya Sushrut has also described the concept of Janpadodhwansa as "Maraka" which is due to the vitiation of Aushadhi and Jala. The treatment includes Sthana parityaga and Shanti karma (Hawan, Daan, Prayschit, Yagya,

Tapa, Niyam, Daya, Shraddha, Bhakti in Devta, Brahmin and Guru).¹¹ Acharya Bhela has described Janpadodwansa same as Acharya Charaka due to vitiation of Desh, Vayu, Jala and Kala.

Approach of Ayurveda in prevention of COVID 19:

It is essential to explore how Ayurveda can help in addressing the COVID-19 challenge across the world. Ayurveda has a lot to offer in this ongoing pandemic of SARS-CoV-2 infection. It will complement modern medicine to reduce the burden of COVID-19 as well as offer an effective way to manage the current ongoing situation.

This is the time to mainstream the Ayurvedic principles and demonstrate its potential in restoring health. Ayurveda is a science of life which provides curative as well as preventive principles for a healthy life. Ayurvedic treatment aims at eliminating impurities, reducing symptoms, boosting immunity, reducing stress and increasing harmony in life. Since there is no cure available prevention seems to be the only way left in current scenario.

The treatment advocated with allopathic medicines for curing COVID-19 does not help in boosting immunity and reducing risk of infection. This treatment seems to be inadequate and calls for better strategies and approaches in public health. Following Ayurvedic measures can help with prophylaxis of COVID-19 and protection of vulnerable target organs.

Ushnodak sevan (warm water):

Drinking warm water is a remedy for many diseases and has been practiced in India for several years. Warm water is considered Agni Deepak, Kapha nashak, Shwasa, Kasa, Jwara nashak and Pathya as per Acharya Sushrut¹². Many drugs like- Shunthi, Musta, Yashtimadhu, Khaset etc can also be added to hot boiling water and their kwath can be taken as a treatment for ailments.

Kavala-Gandusha (Medicated mouth rinse and gargle):

Warm medicated oils and liquids are used as mouth rinse and gargle to cleanse the oral cavity. Kawala and Gandusha cleanses the oral cavity, pharynx, tonsillar area, coat the mucosa as biofilm and has immunomodulatory, antioxidant and antimicrobial effects¹³.

Nasya (Instillation of medicated oil through nostrils):

Traditional Ayurvedic nasal oil that moisturizes, soothes nasal passage, relieves tension, cures supra clavicular diseases and promotes health. Pratimarsha Nasya of Tila tail, Anu tail, Sarshap tail can be given, 2-2 drops in each nostrils daily. Nasal oil application for prevention of COVID-19 infection has been already proposed by Researchers of Traditional Chinese Medicine¹⁴. Pratimarsha Nasya (Anu taila/sesame oil) has found to be effective in preventing as well as curing Nasobronchial diseases and enhancing respiratory immunity. Role of Anu tail can be effective in treating COVID-19.

Dhoompana:

Procedure in which medicated smoke is inhaled through the nose and mouth to prevent and cure their respective diseases. Acharya Sushrut states that Dhoompana prevents conditions like- coughing, dyspnoea, anorexia, intonation (swarbheda), sneezing, sudden apnea, rhinitis, diseases of head, vata and kapha mukha rogas¹⁵.

The above mentioned preventive measures can be practiced as home-based care and may prove to be an effective prophylaxis approach against COVID-19. Therapeutic approaches like massage, oil pulling, nasya offers effective means of nourishing the tissues, thus preventing the worsening of the disease and also improving quality of life and reducing stress

Rasayana (Immunomodulatory drugs):

Coronavirus has drastic effect especially on immunocompromised persons. SARS-CoV-2 mainly alters immune regulatory mechanism and damage immune homeostasis¹⁶. In Ayurveda Rasayan dravyas are known for their immunomodulatory and rejuvenating effects. So Rasayana dravyas may have direct relevance to the prophylaxis and management of SARS-COV-2 infection. The morbidity and mortality rates are very high, but mortality and morbidity rate in India is very less as compared to rest of the world. This may be due to good immune system and use of herbs in the form of spices in day to day life. Ayurveda offers numerous drugs and formulations which have antiviral and immunomodulatory effects, and can be used in preventing the onslaught of Novel corona virus.

Ashwagandha (*Withania somnifera*):

Withania somnifera, known commonly as Ashwagandha, Indian ginseng or winter cherry, is a plant in the Solanaceae family. It is useful medicinal herb in Ayurveda as Rasayana. Many in vitro and animal experiments suggests its effects on the immune, CNS, stress conditions, maintaining physical and mental health as well as in combating inflammatory conditions. It contains series of steroidal saponins known as Withanolides which have anti inflammatory and immunomodulatory effects. Ashwagandha enhances nitric oxide synthetase activity of the macrophages, which increases the cell mediated immune response¹⁷. It can be helpful in curing COVID-19 due to its Rasayana, Kapha shamak and Shwashara properties as per Ayurveda.

Guduchi (*Tinospora cordifolia*):

Guduchi is considered as one of the best Rasayana dravyas in Ayurveda. Also known as Amrita, Chinnruha, Giloy. It rejuvenates dead cells and has immuno modulatory effects and will be effective against COVID-19 infections by enhancing innate immunity. Supports immune system, supports standard white blood cell structure, function and levels. A review shows it has Antiviral and immunomodulatory effects¹⁸.

Anti-HIV effects of root extract of Guduchi were revealed by reduction in eosinophil count, stimulation of B lymphocytes, macrophages and polymorphonuclear leukocytes and Hemoglobin percentage thus, showing its promising role in the management of the virus related diseases^{19,20}. Sanshamani vati (Guduchi ghan vati) containing aqueous extract of *Tinospora cordifolia* can be advised as 500mg twice daily for 15 days with luke warm water as a prophylactic drug against COVID-19²¹.

Guduchi is also effective in cough, debility and fever.

Shatavari (*Asparagus racemosus*):

It is an important Ayurvedic drug having effect mainly on reproductive system. Shatavari has immunoadjuvant potential with DPT vaccine by significant upregulation of Th-1, Th-2 and cytokines and immune stimulation property by significant increase of CD4/CD8 along with T cell activation²².

Amalaki (*Phyllanthus embelica*):

Amlaki is the most commonly used drug as Rasayana. Indian gooseberry is found to be effective against Herpes Simplex Virus type I and type II, Hepatitis B virus, Human Papilloma Virus. Acharya Charak has described it as the best rejuvenating herb²³. It is a rich source of vitamin C. Acharya Charak has also given the concept of Amalak Rasayan which was used by Rishis for rejuvenation, health promotion and intellect²⁴. Amalaki improves immune response by enhancing IL-2, gamma-IFN and natural killer cell activity. It is well known for its anti-aging, detoxification and antioxidant properties²⁵. It can be useful prophylaxis against COVID 19.

Yastimadhu (*Glyceriza glabra*):

Yastimadhu commonly known as Mulethi is mainly used for its Sleshmharproperties. The major component Glycyrrhizin of this plant is more effective than common antivirals in inhibiting the replication of SARS virus and also inhibits its adsorption and penetration²⁶. Mulethi has antiviral activity against HIV, has potent immunomodulatory and antioxidant effect²⁷.

Haridra (*Curcuma longa*):

Haridra is commonly used as daily spices in India. It is used for the respiratory problems like- cough, sinusitis, running nose, inflammatory conditions. Its main chemical constituent which is responsible for the yellow colour of turmeric is curcumin. Curcumin evaluated for activity against severe acute respiratory syndrome which is associated with SARS-CoV-2 using a cell-based assay exhibited strong anti-SARS-CoV effects²⁸. Several studies show that curcumin is effective against Influenza A virus, HIV, Hepatitis C, Herpes Simplex Virus. Half tea spoon of turmeric powder in 150 ml of hot milk can be used once or twice a day for boosting immunity as per ministry of AYUSH. Use of Haridra can be a promising factor against COVID-19.

Tulsi (*Ocimum sanctum*):

Tulsi is commonly used in cough, cold, stomach disorders, fever especially Malaria. Many in vitro, animal and human studies showed that Tulsi has multiple therapeutic actions including antimicrobial, anti-inflammatory and immunomodulatory effects²⁹.

A study on Asthmatic patients revealed that 500mg of dried Tulsi leaves taken three times a day improves vital capacity and provides symptomatic relief in asthma within 3 days³⁰.

Chayavanprash:

It is mentioned by Acharya Charak as Rasayana. Chaywanprash is effective against cough, respiratory ailments, swara bheda, lung disorders. According to Charak this Avleha improves memory, intellect, promotes health and prevents aging.³¹ Daily consumption of 10gm Chayavanprash is considered effective against respiratory diseases.

Agastya Haritaki:

It is another Rasayana mentioned by Acharya Charak in the form of Avleha. It promotes health, strength and longevity, delays aging and cures cough, cold, rhinitis, fever etc.³² It can be helpful in preventing symptoms of corona virus.

Suwarna prashan:

The concept of Suwarna prashanis propounded by Acharya Kashyap³³. However use of Suwarna during infantile period is mentioned by various Acharyas for improving memory, digestion and immunity. Suwarna is administered to the new born babies with Madhu and Ghrita in the form of lehan³⁴. Immunostimulant activity of Gold Bhasma is found to be effective on animal models (mice)³⁵. It can be a preventive measure against diseases.

Role of Yoga and Meditation in preventing mental hazards due to COVID-19:

From the very onset of this pandemic the world is in fear. The initiative of lockdown turned out to be fruitful but it also gave increase to domestic violence, increased screen timing of both adult and children, loneliness and depressive feelings are likely due to mandatory social distancing measures. Moreover, the threat of death or being infected and sudden loss of income and jobs has increased mental problems like- Stress, Anxiety and Depression.

Ayurveda also advocates non- pharmacological measures like sleep, yoga, pranayama and meditation which are key to strengthen body, mind and soul. Acharya Charak has marked the importance of sleep by including it within the Tryoupstambha (tripod)³⁶. Acharya Charak has mentioned Nidra as- Sukhkar (happiness), Pushtikar (nourishment), Balyakar (strength), Vrishya (aphrodisiac), Dhyankar (learning, memory), Jeevankar (life giving)³⁷.

Several studies have endorsed the role of breathing techniques (pranayama), postures (asanas), and procedures (yogic kriya) in improving lung health and exercise tolerance³⁸.

Pranayama is known to improve respiratory functions. Meditation reduces stress. Yoga and meditation for atleast 30 minutes a day can be simple and useful home-based practice for the prevention and post-recovery management of COVID-19. This needs further research innovation and education by spreading awareness.

Other Principles of Ayurveda:

Ayurveda has a lot to offer in this space through its various principles- having proper diet, following Aahar vidhi visheshayatan, Aahar vidhi vidhan, Dinacharya, Ritucharya, Virudh aahar, Pathya apathya palan.

Ongoing research work:

There are already more than 50 ongoing studies in India. The Ministry of AYUSH and Council for Scientific and Industrial Research with support from Indian Council of Medical Research has initiated many clinical trials for prophylaxis and treatment with Ayurvedic formulations.

Conclusion:-

The rich flora of India provides various medicinal herbs possessing antiviral anti-inflammatory properties. Current management is largely supportive with no specific treatment available. Use of herbal medicines can prove to be helpful in preventing COVID-19 as well as in symptomatic management. This is the time to prove how Ayurveda can help in this global crisis. Although the challenges of disease are occurring in newer forms but they can be tackled with an optimistic approach through research in Ayurveda.

References:-

1. Cucinotta D, Vanelli M. WHO declares COVID 19 a pandemic. Acta Bio Med (Internet). 2020 Mar 19 (Cited 2020 Jul 13); 91(1):157-60. <https://doi.org/10.23750/abm.v91i1.9397>
2. Ministry of AYUSH. Ayurveda's immunity boosting measures for self care during COVID 19. 2020, available from <https://www.mohfw.gov.in/pdf/immunityBoostingAYUSHAdvisory.pdf>
3. Gorbalenya AE, Baker SC, Baric RS, et al. Severe acute respiratory syndrome-related coronavirus: The species and its viruses- a statement of the Coronavirus Study group. bioRxiv 2020. <https://www.biorxiv.org/content/10.1101/2020.02.07.937862v1>
4. Nikhat S, Fazil M. Overview of COVID-19; its prevention and management in the light of Unani medicine. Science of the Total Environment 2020. Vol 728:138859. <https://doi.org/10.1016/j.scitotenv.2020.138859>
5. (Chen N, Zohu M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet. 2020; 395(10223):507- 13)
6. www.worldometers.info
7. www.who.int
8. Agnivesha. Charak samhita, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi.revised edition Chaukhambha subharti prakashan, Varanasi. Viman sthan. page-692 shlok- 3/6
9. Agnivesha. Charak Samhita, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition Chaukhambha subharti prakashan, Varanasi. Viman Sthan. Page-694-695
10. Vagbhatta. Astanga Samgraha of Vagabhata edited by Prof.K.R.Srikantha murthy (text, English translation), ninth edition, Varanasi, Chaukhambha Orientalia,2005. Sutra Sthan Page 216 shlok 9/71
11. Sushruta. Sushruta Samhita. Edited by Kaviraj Ambikadutta Shasri. Reprint edition Varanasi: Chaukhambha Sanskrit Sansthan. Uttar tantra, 2016. Page-30 shlok-6/19
12. Sushruta. Sushruta Samhita. Edited by Kaviraj Ambikadutta Shastri. Reprint edition Varanasi: Chaukhambha Sanskrit Sansthan. Sutra sthan, 2016. Page-221 shlok 45/39-40
13. Shanbhang VK. Oil pulling for maintaining oral hygiene- A review. J Tradit Complement Med 2017;7: 106-109.
14. Fan W, Zeng J, Xu Y. A theoretical discussion of the possibility and possible mechanisms of using sesame oil for prevention of 2019-nCoV (COVID-19 coronavirus) from the perspective of colloid and interface science. ResearchGate 2020; DOI: 10.13140/RG.2.2.31786.98248
15. Sushruta. Sushruta Samhita. Edited by Kaviraj Ambikadutta Shastri. Reprint edition Varanasi: Chaukhambha Sanskrit Sansthan. Chikitsa sthan, 2016. Page-224 shlok 40/16
16. Patwardhan B, Chavan -Gautam P, Gautam Tillu G, Chopra A, Gairola S, et al. Ayurveda rasyana in prophylaxis of COVID-19. Cuur Sci. 2020;118:1158-60
17. Ruchi Tiwari, Sandip Chakraborty, Mani Saminathan, Kuldeep Dhama and Shoor Vir Singh, 2014. Ashwagandha (Withania somnifera): Role in safeguarding health, immunomodulatory effects, combating infections and therapeutic applications: A Review. Journal of Biological Sciences, 14: 77-94 <https://scialert.net/abstract/?doi=jbs.2014.77.94>
18. Sharma P, Dwivedee BP, Bisht D, Dash AK, Kumar D. the chemical constituents and diverse pharmacological importance of tinospora cordifolia. 2019; 5(9) e02437. <https://doi.org/10.1016/j.heliyon.2019.e02437>
19. Saha S, Ghosh S. Tinospora cordifolia: One plant, many roles. Anc Sci Life. 2012; 31(4): 151-159. <https://doi.org/10.4103/0257-7941.107344>
20. Akhtar S, Use of Tinospora cordifolia in HIV infection. Indian Journal of Pharmacology. 2010; 42(1):57. <https://doi.org/10.4103/0253-7613.62402>
21. ministry of AYUSH, Advisory from ministry of AYUSH for meeting the challenge arising out of spread of corona virus (COVID 19) in India. <https://www.ayush.gov.in/docs/125.pdf>
22. Gautam M, Diwanay S, Gairola S, Shinde Y, Patki P, Patwardhan B. Immunoadjuvant potential of Asparagus racemosus aqueous extract in experimental system. Journal of ethanopharmacology. 2004;91 (2-3):251-55. <https://doi.org/10.1016/j.jep.2003.12.023>
23. Agnivesha. Charak Samhita, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition, Chaukhambha Subharti prakashan, Varanasi. Sutra Sthan page-468 shlok-25/40
24. Agnivesha. Charak Samhita, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition, Chaukhambha Subharti prakashan, Varanasi. Chikitsa Sthan page-18 shlok-1/75
25. Saini A, Sharma S, Chibber S. Protective efficacy of Embelica officinalis against Klebsiella pneumoniae induced pneumonia in mice. Indian Journal of Medical Research. 2008; (2):188-93
26. Cinatl J, Morgenstern B, Bauer G, et al. Glycyrrhizin, an active component of liquorice roots, and replication of SARS- associated coronavirus. Lancet 2003;361:2045-2046.

27. Akamatsu H, Komura J, Asada Y, Niwa Y. Mechanism of anti inflammatory action of glycyrrhizin: effect on neutrophil functions including reactive oxygen species generation. *Planta Medica*. 1991; 57(02):119-21. <https://doi.org/10.1055/s-2006-960045>
28. Wen CC, Kuo YH, Jan JT, et al. Specific plant terpenoids and lignoids possess potent antiviral activities against severe acute respiratory syndrome coronavirus. *J. Med. Chem.* 2007; 50:4087- 4095 . <https://doi.org/10.1021/jm070295s>
29. Jamshidi N, Cohen MM. The Clinical Efficacy and Safety of Tulsi in Humans: A Systematic Review of the Literature. *Evidence Based complementary and Alteranative Medicine*. 2017; <https://doi.org/10.1155/2017/9217567>
30. Sharma G. Antiasthmatic efficacy of *Ocimum sanctum*. *Sachitra Ayurved*. 1983; 35:665-668
31. Agnivesha. *Charak Samhita*, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition Chaukhambha subharti prakshan, Varanasi. Chikitsa sthan. Page-16 shlok-1/70-74
32. Agnivesha. *Charak Samhita*, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition Chaukhambha subharti prakshan, Varanasi. Chikitsa sthan. Page-539 shlok-18/61-62
33. kashyap, *Kashyap Samhita*, Edited by Shri Satyapala Bhisagacharya, Reprint edition, Chaukhambha Sanskrit Sansthan, Varanasi, Sutra sthan 2019, page-6
34. Shushruta. *Shushruta Samhita*. Edited by Kaviraj Ambikadutta Shastri. Reprint edition Varanasi: Chaukhambha Sanskrit Sansthan. Sharir sthan, 2016.page-102 shlok-10/14
35. Bajaj S, Ahmad I, Raisuddin S, Vohora SB, Augmentation of non-specific immunity in mice by gold preparations used in traditional systems of medicine. *Indian J Med Res*. 2001 May;113: 192-6
36. Agnivesha. *Charak Samhita*, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition Chaukhambha subharti prakshan, Varanasi. Sutra sthan. Page-227 shlok-11/35
37. Agnivesha. *Charak Samhita*, Edited by Pt.Kashinath Shastri and Gorakhnath Chaturvedi. Revised edition Chaukhambha subharti prakshan, Varanasi. Sutra sthan. Page-418 shlok-21/36
38. Kaminsky DA, Guntupalli KK, Lippmann J, et al. Effect of yoga breathing (Pranayama) on exercise tolerance in patients with chronic obstructive pulmonary disease: a randomized, controlled trial. *J Altern Complement Med* 2017; 23:696–704.