

## LITERATURE REVIEW ON ROLE OF RASA DRAVYA TO BOOST IMMUNITY

Dr. Nalini R. Hedao<sup>\*1</sup>, Dr. Mukund B. Bandale<sup>2</sup> and Dr. Rajendra P. Sharma<sup>3</sup>

<sup>1</sup>Assistant Professor, Dept. of Rasashastra & B.K., G. A. C., Nanded.

<sup>2</sup>Reader, Department of Sharira Rachana, Dr. V. P. A. C., Jalana.

<sup>3</sup>Associate Professor, Dept. of Rasashastra & B.K., N.I.A., Jaipur.

**Corresponding Author: Dr. Nalini R. Hedao**

Assistant Professor, Dept. of Rasashastra & B.K., G. A. C., Nanded.

Article Received on 08/10/2020

Article Revised on 29/10/2020

Article Accepted on 19/11/2020

### ABSTRACT

According to Ayurveda Immunity can be correlate with *Bala*, *Oja* and *Vyadhi kshamatva*. *Bala* includes physical and mental strength. *Oja* circulates along with Rasa (and Rakta) and responsible for resistance against disease. *Vyadhi kshamatva* is an ability to resist the severity of the disease / ability to prevent the onset of the disease. The aim of this study to review concept of immunity and *rasayana* according to Ayurveda and modern science. And to collect *rasa dravya* which are effective as an immunity booster. In the present study detail description given about immunity and *rasayana* according to Ayurveda classics. An effort has been taken to collect the *Rasa Dravya* which have major role as an immunity booster and explained how they effective. The extract of this study, Parada known as Rasa in the form of *Rasaushadhi ex. Vasant kalpa, kupipakva, Pottali, kharaliya* etc these are effective as a *rasayana, yogavahi* and immunity booster. As well as *Rasa, Dhatu bhasma, Maharasa, Uparasa* and other single *dravya* also plays an important role to improve immunity.

**KEYWORDS:** The aim of this study to review concept of immunity and *rasayana* according to Ayurveda and modern science.

### INTRODUCTION

Immunity is a protection against disease caused by infections micro-organisms or by other foreign substances and cell changes that could make you ill. It is made up of various organs, cells and proteins. The main function of the body immune system is to fight disease-causing germs (pathogens) like bacteria, viruses, parasites or fungi, and to remove them from the body, to recognize and neutralize harmful substances from the environment, and to fight disease-causing changes in the body, such as cancer cells.

According to Ayurveda Immunity can be correlate with *Bala*, *Oja* and *Vyadhi kshamatva*. *Oja* circulates along with *Rasa (and Rakta)* and responsible for resistance against disease. *Vyadhi kshamatva* is an ability to resist the severity of the disease / ability to prevent the onset of the disease.

There are two subsystems within the immune system, known as the innate (non-specific) immune system and the adaptive (specific) immune system. The innate immune system provides a general defense against harmful germs and substances, so it's also called the non-specific immune system. It mostly fights using

immune cells such as natural killer cells and phagocytes ("eating cells").

The main job of the innate immune system is to fight harmful substances and germs that enter the body, for instance through the skin or digestive system.

The adaptive (specific) immune system makes antibodies and uses them to specifically fight certain germs that the body has previously come into contact with. This is also known as an "acquired" (learned) or specific immune response.

In Ayurveda three types of *Bala* mentioned that are *Sahaj, Kalaj* and *Yuktiyukta*. Natural

Immunity influenced by race/ geography/ age/ season and other individual factors.<sup>[1]</sup> According to Acharya *Charaka*, peoples have not equally capable of resisting disease and also have not equal ability to resist the onset of the disease.<sup>[2]</sup>

*Oja* is also known as essence of dhatu.<sup>[3]</sup> Acharya *Charaka* mentioned *guna of kapha* that are Lubrication, Stability, Heaviness/ Density, sexual Health, Strength, Resistance, Mental Stability,

Desire with reasonable limits which can be resemble as bala.<sup>[4]</sup>

In the present study effort has been taken to collect *Rasayana* or immunity booster effect of *Rasa dravya* as per Ayurveda and modern science. In this study immune modulator or enhancer effect is correlate with *rogagnata* or *guna* of *Rasa dravya* i.e. pharmacological action like *balya*, *Rasayana*, *Ayushya*, *Ojovardhanam* and also compare the *Rasa*, *Virya*, *Vipaka* and *doshagnata* from *Rasa Rasaratna sammuchhaya* and *Rasa Tarangini* (Rasashastra classics). Finally concludes the studies at ever conducted as an immunomodulator or immune enhancer effect.

#### AIMS AND OBJECTIVE

- 1) To review action of *Rasa dravya* as an immunity modulator or immunity booster according to Ayurveda.
- 2) To study action of *Rasa dravya* as an immunity modulator or immunity booster according to modern point of view.

*Rasayana* means an improved state of nourishment, which in turn upholds increased immunity and youthfulness. *Rasayana* can be a drug, diet or even a life style and conduct i.e., *Acar*, which may be helpful in achieving the above goal. The *Rasayanas* are supposed to strengthen *Oja* and *Bala* i.e., vitality and bio strength with natural resistance against aging and disease. It is stated to contribute to the integrity of body tissues and thus increases longevity. The other benefits of this therapy are the promotion of memory and intelligence, the preservation of youth, luster, complexion and voice.

#### Types of Rasayana Therapy

##### A. As per scope of use<sup>[5]</sup>

- a. **Kamya Rasayana** - Kamya rasayana is used to serve a special purpose. It is also used to promote general physical & mental health. It is of three types.
  1. **Prana kamya rasayana** – It is used for achieving or maintaining the best quality of prana in the body. E.g. Amalaki, Haritaki, Guduchi etc. are used for this purpose.
  2. **Medha kamya rasayana**- e.g. Brahmi, vacha, Mandukparni, shankhapushapi etc. are used for enhancing memory & intellect.
  3. **Sri Kamya rasayan** –Promoter of complexion. e. g. Guduchi, Amalaki, Triphala, Ashwagandha etc.
- b. **Naimittika Rasayana** - To be used in person suffering from specific disease Naimittika rasayana is not.

The specific medical treatment for particular diseases, but it is used as adjuvant along with the specific Management of disease.

#### B. As per method of use

- 1) **Kutipraveshik Rasayana** – It is an Indoor therapy. This is administrated by keeping the Individual inside a special cottage.
- 2) **Vatatapika Rasayana** – It is an outdoor therapy. This is administrated even if the individual is exposed to the wind and the sun. In today's lifestyle we can administer this rasayana without disturbing our daily routine.

#### C. As per contents of rasayana

1. **Aushadha rasayana** – Based on drugs and herbs
2. **Ajastrika rasayana**- In this type food is used as rasayana for nourishment of body.e.g. Cow's milk, ghee, honey.
3. **Achara rasayana** – Based on conduct and behavior

#### Benefits of Rasayan Therapy<sup>[6,7]</sup>

According to Acharya *Charak*, *Rasayan* therapy Enhances the intelligence, memory power, will power, body strength, skin lecture, sweetness of voice and physical strength. It nourishes the *Sapta dhatu* and thus prevents chronic degenerative changes and illness. *Rasayan* is improve metabolic processes, which results in the best possible biotransformation and produce best quality body tissues, eradicate senility and thus help prevent diseases of the old age. It helps attain optimal physical strength and sharpness of sense organs. *Rasayan dravyas* have significant action on reproductive system and nourishes *Shukra dhatu*. *Rasayana* nourishes the whole body, helps maintain physiological functions at optimum level, thus also improves body's natural resistance against infections by increasing Immunity. *Rasayan* invigorates the body in general by sustaining the required balance between anabolism and catabolism. *Rasayan* therapy which regulates the circulation of vital fluid, eliminates the waste product, rejuvenate the nervous system as well. It prevents wasting of muscles, delays the ageing process, nourishes bones, tendons etc.. Prevents osteoporosis, prevents premature greying of hair and provides good sleep and appetite. *Rasayana kalpa* keep body and mind function at their optimum best.

Table 1: Shows List of Rasashastra dravya and their karma related to Immunity modulator.

Sr. No.	Dravya	Rasa	Virya/ Vipaka	Doshagnata	Karma	
					Sharirik Karma	Manasik Karma
1	Abhraka	Swadu, Snigdha	Param shishir	Vat, pitta kaphagnata	Param Amruta, Aayushya agrya, Balya – R.R.S.2/2 Chatibalya, Medhya – R. T. 10/72-73	praghya bodhi – R.R.S.2/2

2	Vaikrant			Doshatrayapahar	Ayushpradshrch, Balavarnakara, Pragyaprad – R.R.S- 2/55- 57 Bahuyogvahi, Atirasayanchha, Jarashoshadi Shamana, Dehadardhyakara – R. T. 23/167- 169	Pragyaprad – R.R.S- 2/55- 57 paramachha Medhya- R.T. – 23/167-169
3	Makshik	Swarnamakshik- Madhur Rajat makshik- Amla	Vipaka – Katu Virya - Sheetal	Tridoshaghna	Jaravyadhi, Param hi Vrushya, sarva Rasayan agrya- R.R.S. 2/79 Yogavahi Param – R. T. 21/26-28	
4.	Shilajatu	Tikta	Vipak - Katu		Balya, Rasayan, Balya, Yogavahi – R.T. 22/85-86	
5.	Sasyaka				Rasayanam – R.R. S. – 2/128 Balya, Rasayana- R. T. 21/127-129	
6.	Gandhak	Madhur	Vipak – Katu Virya - Ushna		Atirasayana, Vishahar – R. R. S. 3/16 Rasayanottama – R. T. - 8/36- 38	
7.	Kasis	Kashay	Vipak – Katu Virya - Ushna		Balya, Vishaghna – R. T. 21/231-233	
8.	Harataal	Katu	Virya - Ushna	Kaphaghna	Vishghna – R.R.S. 3/68 Rasayanam – R. T. 11/52-54	Bhootnut – R.R.S. – 3/68
9.	Manasheela	Tikta, Katu	Ushna	Kaphavatahanti	Sarvarasayan agrya, Vishaghna – R.R. S.- 3/91 Rasayani, Vishapaha- R. T. 11/116-116	Bhootaghna – R.R.S.- 3/91
10.	Neelanjan	Guru	Virya - Sheet	Tridoshashamak	Rasayanam – R.R.S. 3/100- 104	
11.	Hingula			Sarvadoshaghna	Deepana, Atirasayana, Vrushya – R. R. S. 3/140- 141 Dehakanti bala vardhanam - R. T. 9/18-19	Buddhivardhanam – R.T. 9/ 18 -19
12.	Manikya	Madhur		Vatpittahar param, Kapha prashaman	Rasayanam, Deepanam, Vrushya, Aayushya, Vajikaranam – R.T. – 23/57- 58	Bhootvetal pagghna - - R.R.S. – 4/12 Medhya – R.T. -23/57-58
13 .	Mukta	Madhur	Virya - Sheetal	Kaphapittaghna	Agnipushtikaranam, Vishahari, Vrushya, Aayushya, Veeryaprad – R.R.S. 4/13 Vrushya, Aayushya, Deepan, Vishapaha, Dehaveerya balavardhanam – R.T. 23/72-74	Medhya, Buddhivardhanam – R. T. 23/72-74
14.	Praval	Madhur	Virya – Sheetalam	Tridoshashamanam visheshat Kapha vaatnut	Veerya varna vardhanam, Balya , Vishaghna – R. T. 23/ 139-141	Bhootshamanam – R.T. 23/139-141
15.	Tarkshya				Visha, Oojovivardhanam, Agnimandyanut – R.R. S. - 4/22 Balya, Vrushya – R.T. 23/ 109-110	

16.	Pushparag			Kaphavaatghna	Aayushya, Bruhana, Vishaghna – R.T. 23/93-94	Medhya- R. T. 23/93- 94
17.	Vajram	Shadarasanvitam		Doshatraya prashamana	Aayushprada, Mrutunjay, Amrutopama , Vrushya – R.R.S.- 4/32 Yogavahi, Sarvotkrushta Rasayana, Maha ayushyam ativ, Balya- R.T. 23/25-26	Medhya- R. T. 23/25 -26
18.	Indraneel			Tridoshaghna	Balya – R. T. 23/101 -102	
19.	Gomed			Kaphapittaghna	Deepan, Pachan, Balya – R.T. 23/125- 126	Buddhi prabodhanam- R.R.S. 4/56
20.	Vaidurya	Madhur	Virya-Sheeshir	Pittapradhan rogaghna	Pradhnya Aayu Balavardhanam, Deepan – R.R.S. – 4/59 Aayushya, Balya, Bruhana param – R.T. 23/117-118	Medhya – R.T. 23/117- 118
21.	Suvarna	Madhur	Vipak-Swadu		Ayukara, saukhyapushti prakashi, Gadahara, Viryavruddhi, Vishagadaha, Vrushya, Balya, Rucha, Dipti – R.R.S. 5/10-11 Rasayana, Vishapaha, Aayushya agrya, Balya, Vayasthapan Uttam- R. T. 15/69-78	Dhi, smrutikara, Bhootavesh prashanti, Medha buddhi smruti sukhakar- R.R.S. 5/10-11 Param Medhya, Chinta shok bhaya krodh sambhut aamay nashanam R. T. 15/69 – 78
22.	Raupya	Kashay, Amla	Vipak – Madhur Virya - Sheet	Kaphavataghna, Agnidipti	Balya Param, Sthirvayakaranamch- R. R. S. 5/28-29 Vayasthapan Uttam, Balya param, Param Rasayana, Aayushya, Vanhimandya prashamana R.T. 16/ 46-51	Medhya R.R.S. 5/28-29 Smruti vardhana, Kshin Buddhi Smruti Sahasa and Adhyapanadao suchir R. T. 16/46-51
23.	Lauha	Tikta	Sheet	Tridoshashaman	Kantlauha– Atirasayana, Chirayuprada Lauhabhasma guna – Balakar, Vrushya, Vayastambhanam, Rasayanvar, Vishapaham R. R.S. 5/ 136-139 Balya – R.T. 20/83	Medhya – R.T.20/83
24.	Naga				Rasayana – R. R. S. 5 / 180	
25.	Vanga	Tikta, Kashay, Lavan kinchit	Virya - Sheet	Sleshma prashaman	Rasayana, Balya – R.T. - 18/40	Medhya, Dhrukikaram- R.T. 18/40
26.	Mritparad				Bala vriddhi, virya vriddhi, deha drudhakar, jarahar – R.T.11/36-40	Smritivardhak R. T. 11/36- 40

**Table 2: Shows Studies conducted on Rasa dravya to evaluate immune response of Rasa dravya.**

Sr. No.	Bhasma	Action	Explanation
1.	Swarna bhasma <sup>[8]</sup>	Immunomodulatory effect	Non Specific Immunity Increased counts of peritoneal macrophages and also stimulated the phagocytic index of macrophages, validating its immunomodulatory effect. Traditional preparations of gold exhibited immunostimulant activity on macrophage functions in contrast to immunosuppressive effects of AN(Auranofin).
2.	Swarna Bhasma <sup>[9]</sup>	Free Radical Scavenging Activity	In an experimental animal model, chronic Swarnabhasma-treated animals showed significantly increased superoxide dismutase and catalase activity, two enzymes that reduce free radical concentrations in the body. Swarna Bhasma enhanced activity of SOD (Superoxide dismutase) and catalase (80% compared

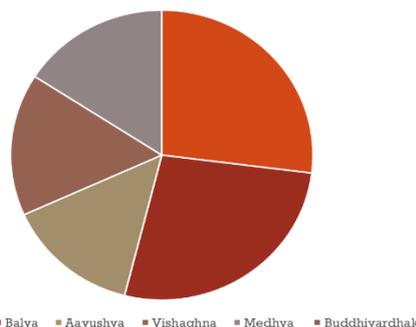
			to control haemolysate) which can be co-related with the improved pathophysiological conditions of the patients.
3.	Swarna <sup>[10]</sup>	Immunoenhancement effect	To study effect of gold on immune response, separate concurrent injection of organic gold compounds and antigen into mice resulted in immunoenhancement that could be measured by direct and indirect plaque-forming cells, rosette-forming cells, and serum antibody assays.
4.	Swarnamakshika Bhasma <sup>[11]</sup>	Phagocytic activity	Positive control group showed significant (p<0.001) phagocytic activity at the dose of 0.6 mg when compared to other different doses.
5.	Mukta Bhasma <sup>[12]</sup>	Immunomodulatory Effect	Increase in the NBT assay, Phagocytosis and Chemotaxis represents good Immunomodulatory effect of Mukta Bhasma at the dose of 0.06mg.
6.	Abhrak Bhasma <sup>[13]</sup>	Immunomodulator Effect	Shataputi Abhrak Bhasma brings about stimulation of Leucocytes in concentration dependent manner. 5% and 10 % solutions of Shataputi Abhrak Bhasma stimulated 93% and 93.5% leucocytes respectively, which is an indicator of highly significant phagocytic activity.

## DISCUSSION

The factors responsible for the *Bala* or *Vyadhikshamatva* (immunity) include normal equilibrium state of *Dosha* (humors), *Dhatu* (constitutional body tissues), *Agni* (digestive power) and patent *Srotus* (body channels) etc. The innate immune response is more or less similar to the concept of *Sahaja Bala* and the adoptive immune response is more or less similar to the concept of *Yuktikrita Bala* as described in the Ayurveda. *Rasayana* mentioned as a class of important drugs in the Ayurvedic system of medicine is reputed to promote physical as well as mental health, improve defense mechanism and enhance longevity. *Rasayana* act at three levels of the bio-system to promote nutrition, at the level of *Agni* - by promoting digestion and metabolism, at the level of *Srotus* - by promoting microcirculation & tissue perfusion and at the level of *Rasa* itself by acting as direct nutrient. The integrity of channels is equally important for the distribution of *Ojas* to the *Dhatu*s, as discussed earlier, which provides body immunity against degeneration and diseases.

In the present study effort has been taken to compile pharmacological action of *Rasa dravya* related to immunity modulator, immunity enhancer from the classics *Rasaratna sammuchhaya* and *Rasa tarangini* as according to Ayurvedic concepts. Compiled action of *Rasa dravya* associated with immunity modulation on body are *Rasayana*, *balya*, *Ayushya agrya*, *Jarahar*, *Vishahar*, *dehadardyakar* etc. and as on *manovaha strotas* are *Medhya*, *Smritiprad*, *Pragyaprad* etc. In this study out of 26 drugs 18 drugs are resemble as *balya*, 17 drugs are coated as *Rasayana*, 9 drugs are *Ayushya agrya*. 10 drugs are found with *Medya* and *Pragyaprad* action. 3 drugs have *jarahar* action. 4 drugs coated with *bhootaghna* property.

Pia Dia. 1 Shows Properties of *Rasa Dravya* corelate with Immunity modulator or enhancer.



As per Ayurveda concepts, while planning about line of treatment of maximum diseases or for rejuvenation therapy first focus on *agni* and *doshaghna*. Out of 26 drugs mentioned in the study maximum drugs having *Tridoshaghna* property and acting on *agni*, *Jatharagni* as well as *Dhatvagni*.

Essence of the study is *Rasa* i.e. *Parada* as well as *Dhatu* i.e. *Metals* plays important role to modulate immunity or enhance immunity. *Rasatarangini* mentioned that *mrit Parada* is *Balya*, *Dehadardhyakar* and also *smritivardhak*. *Mritparad* is not easily available now days but *Murchhit Parad* also plays important role to modulate or enhance immunity in the form of *Makardhwaj Rasayan*, *Hemagarbha pottali* etc.

As we know *Dhatu* built our body. *Suvarna*, *Rajat* and *Lauha* takes important parts as an immunity modulator or immunity enhancer. Instead of above *dhatu*s *Suvarna* have maximum properties which strengthen body and mind. In *Rasatarangini* mentioned it as *Chinta Shok Bhaya Krodha Sambhut Aamay Naashanam*, *Vishahar*, *Vayasthapan* and *Rasaratna sammuchhaya* mentioned *Sukhakar* and *Bhootavesha har*, These property makes *Suvarna* important and unique medicinal drug which plays important role as an immunity modulator or enhancer and oxygen scavenging activity in present era. In *Ratnavarga Mukta*, *Praval* and In *Khanij Abhrak*, *Suvarnamakshik* and *Sheelajatu* also play important role to boost immunity.

*Rasayan dravyas* work as *Immunomodulators* and have antioxidant activity as well. In relation to nonspecific

immunity these drugs increase activation of poly morpho neutrophils (PMN) for phagocytosis and enhance their chemo-attractant capacity.

In relation to specific immunity, they lead to proliferation of lymphocytes leading to production and also cytotoxic induction of T-helper and Natural Killer (NK) cells and activation of complement pathways. Also they significantly increase immunoglobulin levels. Immunostimulants offer promise in enhancing antigen specific (vaccine) and non-specific immune response against infections.<sup>[14]</sup>

*Achar Rasayan* acts as psycho immunomodulator, reduces stress and thus prevents release of free radicals and improves Psycho-Neuro Immunity (PNI)

The stress, unhealthy nutrition and continuous exposure to several toxins in the present era lead to compromised immune system. Therefore, immunomodulation should be of central importance in medical field to combat several infective, chronic, autoimmune & inflammatory diseases. Natural immunomodulators belonging to mineral sources from *Rasashastra* provide a safer & costeffective way of treatment for such type of Disorders.

## CONCLUSION

- factors responsible for the *Bala or Vyadhikshamatva* (immunity) include normal equilibrium state of *Dosha* (humors), *Dhatu* (constitutional body tissue), *Agni* (digestive power) and patent *Srotus* (body channels) etc.
- The innate immune response is more or less similar to the concept of *Sahaja Bala* and the adoptive immune response is more or less similar to the concept of *Yuktikrita Bala* as described in the *Ayurveda*.
- *Rasayana* mentioned as a class of important drugs in the *Ayurvedic* system of medicine is reputed to promote physical as well as mental health, improve defense mechanism and enhance longevity.
- *Suvarna bhasma* shows maximum quality *guna* which plays important role as an immunity modulator or enhancer and oxygen scavenging activity. Other drugs like *Parada kalpa*, *Abhrak Bhasma*, *Rajat Bhasma*, *Lauha Bhasma*, *Mukta Bhasma* also resemble as a good immunomodulator or immunity enhancer.
- Further experimental in vitro and in vivo research studies have to be planned to evaluate exact role of these *rasa dravya* in modulation of innate and specific immunity.

## REFERENCES

1. Ch. Su. 11/36 Charaksamhita of Agnivesa Edited by 'Vaidyamanorama' Hindi commentary by Acharya Vidyadhar Shukla and Prof. Ravi Dutta Tripathi

Published by Chaukhamba Sanskrit Pratishthan Delhi, Sutrasthan, 11/36; 171: 11/36.

2. Charaksamhita of Agnivesa Edited by 'Vaidyamanorama' Hindi commentary by Acharya Vidyadhar Shukla and Prof. Ravi Dutta Tripathi Published by Chaukhamba Sanskrit Pratishthan Delhi, Sutrasthan Ch. Su., 28/6: 429: 28/6.
3. Ashtanga Hrudyam of Srimadvagbhat by Brahmanand Tripathi Published by Chaukhamba Surbharati Prakashana Sutrasthana, Ah. Hr. Su., 11/37: 167.
4. Charaksamhita of Agnivesa Edited by 'Vaidyamanorama' Hindi commentary by Acharya Vidyadhar Shukla and Prof. Ravi Dutta Tripathi Published by Chaukhamba Sanskrit Pratishthan Delhi, Sutrasthan Ch. Su., 18/51: 282.
5. Importance Of Rasayan In Immunity (Vyadhikshamatva) Dr. Manish Kumar Son and Dr. Omprakash Sharma World Journal Of Pharmaceutical And Medical Research ISSN 2455-3301, 196: 198.
6. Vagbhat, Astanghrudaya, with Vidyotini Hindi commentary of Kaviraj Atridev Gupta, Chaukhambha Prakashan, Varanasi, Uttarsthan, Chp., 2009; 39(1,2): 812.
7. Agnivesha, Charak Samhita, with Charak Chandrika Hindi Commentary by Dr. Brahmananda Tripathi and Dr. Ganga Sahay Pandey, Chaukhambha Subharati Prakashan, Chikitsa sthan, Chp.1/1, 2007; 7.8: 5,6.
8. 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; 113: 192-6.
9. A Mitra, S Chakraborty, B Auddy, P Tripathi, S Sen, A.V Saha, B Mukherjee. Evaluation of chemical constituents and free-radical scavenging activity of Swarnabhasma (gold ash), an Ayurvedic drug, Journal of Ethnopharmacology, 2002; 80: 147-/153.
10. Measel JW. Effect of gold on the immune response of mice, Infection and immunity, 1975; 11(2): 350-354.
11. Dr. Veena B Kupati, Dr.P.G.Jadar. Immunomodulatory Effects of Ayurvedic Drugs: A Review. Indian Journal of Applied Research, 2014; 4(11): 28-30.
12. Immunomodulatory effect of Mukta (Freshwater cultured Pearl) bhasma Dr. Poornima B Tukanatti and Dr. P.G.Jadar\* Shri B.M.K Ayurveda mahavidyalaya Shahapura, Belgaum
13. Screening Of Immunomodulatory Effect Of Shataputi Abhrak Bhasma-Ayurveda 'Srasayan Tamhankar Yogesh Laxman International Journal of Ayurveda and Pharma Research ISSN: 2322 -0902 (P) ISSN: 2322 -0910: 22 to 27.
14. Ullagaddi, S.S., Screening of Free Radical Scavenging activity and immunomodulatory effect of Vanga Bhasma, Dissertation submitted Rajiv Gandhi University of Health Sciences, Bangalore.).