

# Unlocking The Power of Ayurvedic *Rasayana* Herbs: A Comprehensive Review on Ayurvedic *Nighantu* and Modern Research Studies

Lincon Kumar Sethi<sup>1\*</sup>, Dixha Chauhan<sup>2</sup>, Midhila K.J.<sup>3</sup>

<sup>1</sup> Lecturer, Dept. of. Agada Tantra Evam Vyavahara *Āyurveda*, GAC & H, Balangir, Odisha.

<sup>2</sup> PG Scholar, P.G. Department of Dravyaguna, A&U Tibbia College, New Delhi.

<sup>3</sup> PG Scholar, Dept of Roga Nidan evam Vikriti Vigyan, GAC & H, Balangir.

## Corresponding author:

Dr. Lincon Kumar Sethi –  
Dept. of. Agada Tantra Evam  
Vyavahara *Āyurveda*, GAC  
& H, Balangir, Odisha, India.  
drlincon23@gmail.com

## ABSTRACT

**Background:** *Rasāyana*, an ancient concept originating from the traditional systems of Indian medicine, represents a comprehensive approach to rejuvenation and longevity. As a key branch among the eight clinical specialties in traditional *Āyurveda*, this practice aids in restoring the body's vital fluids, enhancing overall health, and boosting the quality of *Rasa* (nutritive essence). By enriching the body with essential nutrients, it promotes longevity, sharpens intellect, preserves youthfulness, and enhances physical attributes such as skin radiance, complexion, and voice quality. **Objectives:** To explore the concept of *Rasāyana* and its role in achieving immunity, preventing illness, and slowing disease progression, while drawing comparisons with modern interventions such as antioxidants, dietary vitamins, and immunomodulatory drugs. **Methods:** A review of classical Ayurvedic texts (*Nighantū*) to identify distinct herbal medicines with rejuvenating properties that work at multiple levels, such as *Rasa*, *Agni*, and *Srotas*, alongside insights from modern studies on their impact on immune response cells, including natural killer cells, macrophages, neutrophils, lymphocytes, and cytotoxic T lymphocytes. **Results:** *Rasāyana* enhances immunity, safeguards against illness, and prevents disease relapse. It can be compared to modern interventions like antioxidants and immunomodulatory agents that work at various levels of the immune system. The rejuvenating properties of *Rasāyana* herbs described in various *Nighantū* provide benefits such as improved vitality, longevity, and disease prevention. **Conclusions:** The current review offers an overview of the *Rasāyana* herbs documented in numerous *Nighantū* and supported by various studies, providing insights for future research in the field of preventive and therapeutic healthcare.

**Keywords:** *Rasāyana*, *Āyurveda*, Immunity, *Nighantū*, Antioxidants, Immunomodulatory drugs

## INTRODUCTION

In the realm of healthcare, the diversity of approaches available to treat illnesses reflects the rich tapestry of human ingenuity and tradition. *Āyurveda*, with its roots tracing back thousands of years in the Indian subcontinent, stands as a profound

testament to ancient wisdom. Unlike other medical systems, *Āyurveda* places more emphasis on preserving health than treating illnesses. *Rasāyana*, a key branch of *Ashtanga Āyurveda*, focuses on the use of specific herbs and formulations to restore

the body's balance. This practice not only helps prevent diseases but also delays the aging process by promoting overall health and vitality. These are based on age-old knowledge and are regarded as the science of rejuvenation. In addition to increasing mental clarity, boosting immunity, and revitalizing the body at the cellular level, *Rasāyana* includes a variety of therapeutic techniques, dietary recommendations, and herbal preparations. *Rasāyana* is a lighthouse in a world where longevity and quality of life are valued equally. It provides ageless teachings and doable methods for nurturing the body, mind, and soul.

Certain *Rasāyana* are intended to treat certain illnesses, including diabetes, rheumatoid arthritis, cancer, pulmonary tuberculosis, and so on. They function by encouraging a specific type of immunity that aids in the defence against the intended disease. Tissue-specific *Rasāyana* drugs can be utilized in addition to underlying illness treatment to support tissue strength and disease-fighting ability. Patients will get benefit from quicker relief, fewer recurrences, and better health as a result. Few previous studies have demonstrated their immunomodulatory effects.

## MATERIALS AND METHODS

For this article, *Āyurveda* classics like *Brihatrayee*, *Bhavaprakasha Nighantu*, *Dhanvantari Nighantu*, *Kaiyadeva*

*Nighantu*, *Raj Nighantu*, *Madanapala Nighantu*, *Sodhala Nighantu*, *Madanadi Nighantu* have been thoroughly reviewed to collect the matter related with matter of article. Various authentic journals, PubMed and other databases were also searched for compiling the list of the herbal drugs on which experimental studies have been done.

## DISCUSSION

*Rasāyana* is the science which imparts superior type of 'Rasa' and other *Dhātū* in the body. The role of *Rasāyana* is to rejuvenate the body by eliminating diseases, revitalizing the cells, and stimulating various bodily systems. This enhances the strength of each organ, bolsters physical resilience, and boosts immunity, protecting against illness. A part from all this, it also strengthens the seven *Dhātu*. This enables the person to have an easy victory right at the onset of any disease. This is called metabolic improvement in modern medical science. *Rasāyana* checks the speed of aging physique and renders lasting youth, enhancing the sexual power, and it gives strength to endocrines, which accelerate their secretions that regulate the health and aging process. It also prevents the hazardous effects caused due to improper food, drinks, and behaviour.

**Table 1** Some of the plants commonly used as the potential source of antioxidants in various *Nighantu*

S. No.	Plant Name	B.N <sup>1</sup>	D.N <sup>2</sup>	K.N <sup>3</sup>	R.N <sup>4</sup>	M.N <sup>5</sup>	S.N <sup>6</sup>	Madanadi Nighantu <sup>7</sup>
1.	<i>Shankhpushpi</i>	+	+	+		+		
2.	<i>Guggulu</i>	+		+	+	+	+	+
3.	<i>Rasona</i>	+		+	+	+		
4.	<i>Bhringraj</i>	+		+	+	+		
5.	<i>Gambhari</i>	+		+	+	+		
6.	<i>Pippali</i>	+	+	+		+		+
7.	<i>Kumari</i>	+			+	+		
8.	<i>Shalmali</i>	+		+		+		+
9.	<i>Mushli</i>	+		+	+	+		
10.	<i>Shatavari</i>	+	+	+	+	+		
11.	<i>Haritaki</i>	+		+	+	+		
12.	<i>Amalaki</i>	+	+		+			
13.	<i>Bakuchi</i>	+		+		+		
14.	<i>Guduchi</i>	+	+	+	+	+		+
15.	<i>Kakamachi</i>	+	+	+	+	+	+	
16.	<i>Brahmi</i>	+		+		+		
17.	<i>Ashwagandha</i>	+		+		+		
18.	<i>Jivanti</i>	+		+		+		+
19.	<i>Shalparni</i>	+		+		+		+
20.	<i>Varahikanda</i>	+	+	+	+	+	+	
21.	<i>Beejaka</i>	+		+		+		
22.	<i>Vidarikanda</i>	+				+		
23.	<i>Peelu</i>			+		+		
24.	<i>Vridhdharu</i>			+		+		
25.	<i>Punarnava</i>					+	+	
26.	<i>Bala</i>			+		+		

(B.N – Bhavaprakash Nighantu, D.N - Dhanvantari Nighantu, K.N - Kaiyadev Nighantu, R.N – Raj Nighantu, M.N - Madanpala Nighantu, S.N - Sodhala Nighantu)

Substantial alterations to the atmosphere, diet, and way of life have an impact on human longevity. The biggest challenge facing humanity today is how to live in this altered environment and keep up with the quick pace of life. All these lead to early aging, weakness, weakened immunity, depression, and repeated illnesses. In addition, metabolic diseases and recently identified viruses are posing challenges to the health care systems. The intake of *Rasāyana* serves as a comprehensive solution to address all these health conflicts and imbalances among the public about the

benefits of *Rasāyana* for immunity enhancement.

The herbal drugs enlisted in this article underscore *Āyurveda's* multifaceted approach to health, integrating antioxidant, immunomodulatory, and protective effects against various stressors. While traditional use provides a foundation, modern scientific studies increasingly validate these effects, paving the way for integrated approaches in healthcare. Additional research and clinical studies are crucial to thoroughly understand the underlying mechanisms and maximize the therapeutic



**Table 2:** Drugs with useful extracts and mode of action

S. No.	Drugs	Part/Extract/chemical composition/Animal model used	Mode of action/ Effects seen
1.	<i>Shankhpushpi</i> <sup>8</sup> <i>Convolvulus prostratus</i> Forssk. CONVOLVULACEAE	Aqueous extract Albino rats (100mg/kg, 150mg/kg, 200mg/kg for 30 days)	Exhibited significant antioxidant activity by enhancing free radical scavenging in stress-induced conditions, attributed to its bioactive constituents.
2.	<i>Guggulu</i> <sup>9</sup> <i>Commiphora wightii</i> (Arn.) Bhandari BURSERACEAE	Ethanol extract; STZ-induced diabetic Wistar albino rats (200 mg/kg for 60 days)	Enhances hepatic antioxidant enzyme activity and helps reduce oxidative stress.
3.	<i>Rasona</i> <sup>10,11</sup> <i>Allium sativum</i> L. AMARYLLIDACEAE	Aqueous extract Garlic oil	Provided tissue protection by mitigating oxidative damage induced by nicotine. Demonstrated protective effects against oxidative damage caused by tributyltin (TBT) in both in vivo and in vitro models.
4.	<i>Bhringraj</i> <sup>12</sup> <i>Eclipta prostrata</i> L. ASTERACEAE	Wedelolactone and Demethylwedelolactone (Coumestans) isolated from <i>Eclipta prostrata</i> .	Exhibited trypsin inhibitory activity in an in vitro bioassay, indicating potential immunomodulatory properties.
5.	<i>Gambhari</i> <sup>13</sup> <i>Gmelina arborea</i> Roxb. LAMIACEAE	Methanolic extracts of stem bark Methanolic extract	Showed 85.20% free radical scavenging activity. Demonstrated immunomodulatory potential by restoring total WBC count, which was reduced due to cyclophosphamide-induced cytotoxicity.
6.	<i>Pippali</i> <sup>14</sup> <i>Piper longum</i> L. PIPERACEAE	Alcoholic extract of the fruits and Piperine	Exhibited cytotoxic properties, contributing to its immunomodulatory activity.
7.	<i>Kumari</i> <sup>15</sup> <i>Aloe vera</i> (L.) Burm.f. ASPHODELACEAE	Aloe gel	Contains immunomodulatory components <i>aloelectin A</i> and <i>acemannan</i> . These compounds modulate the immune system by activating macrophages and promoting cytokine production, which helps accelerate wound healing.
8.	<i>Shalmali</i> <sup>16</sup> <i>Bombax ceiba</i> L. MALVACEAE	Methanolic extract of whole plant	Exhibited antioxidant activity by scavenging DPPH radicals, with an IC <sub>50</sub> value of 68 µg/ml.
9.	<i>Mushli</i> <sup>17</sup> <i>Chlorophytum borivilianum</i> Santapau & R.R.Fern. ASPARAGACEAE	Ethanol extract (100ug/ml)	Demonstrated significant antioxidant activity, evidenced by its ability to scavenge DPPH (84.51%), hydroxyl radicals (48.95%), and ferryl bi-pyridyl complexes (84.53%). It also inhibited lipid peroxidation (67.17%) and reduced superoxide anion radical levels through photochemiluminescence.
10.	<i>Shatavari</i> <sup>18,19</sup> <i>Asparagus racemosus</i> Willd. Willd.	Decoction of powdered root of <i>Asparagus racemosus</i> Willd. (Rat and Mice)	Provides protection against experimentally induced abdominal sepsis by boosting the

ASPARAGACEAE			phagocytic activity of macrophages and polymorphonuclear cells.
11.	<i>Haritaki</i> <sup>20,21</sup> <i>Terminalia chebula</i> Retz.	Aqueous extract (Mice)	Stimulated an increase in humoral antibody (HA) titre and enhanced delayed-type hypersensitivity (DTH) response in mice.
	COMBRETACEAE	Aqueous extract	Inhibited xanthine/xanthine oxidase activity and effectively scavenged DPPH radicals, demonstrating strong antioxidant potential.
12.	<i>Amalaki</i> <sup>22</sup> <i>Phyllanthus emblica</i> L. PHYLLANTHACEAE	Fruits extracts	Inhibited chromium-induced free radical generation, apoptosis, and DNA fragmentation. The extract also restored antioxidant levels to normal, countered the immunosuppressive effects of chromium on lymphocyte proliferation, and enhanced IL-2 and gamma-IFN production.
13.	<i>Bakuchi</i> <sup>23</sup> <i>Cullen corylifolium</i> (L.) Medik. FABACEAE	Bavachinin, bakuchiol, barachin, isobavachin and isobarachalcane compounds (Rat liver microsomes and mitochondria)	Inhibited NADH-dependent ascorbate and BuOOH-induced lipid peroxidation, as well as CCl <sub>4</sub> -induced lipid peroxidation in microsomes. The extract also reduced NADH-dependent and ascorbate-induced mitochondrial lipid peroxidation in the liver microsomes.
14.	<i>Guduchi</i> <sup>24,25</sup> <i>Tinospora cordifolia</i> (Willd.) Miers ex Hook.f. & Thomson MENISPERMACEAE	Aqueous extract	Promoted cellular mitosis and stimulated the production and activation of cytokines and immune effector cells.
		Whole plant/Ethanol extract (Male Wistar Albino rats)	Administering the extract to N-nitrosodiethylamine-induced liver cancer rats restored lipid peroxidation levels and normalized both enzymatic and non-enzymatic antioxidant activities.
15.	<i>Kakamachi</i> <sup>26</sup> <i>Solanum nigrum</i> L. SOLANACEAE	Ethanol and methanol extract (Fishes, <i>E. suratensis</i> )	Demonstrated significant immunostimulant potential against fish disease-causing microorganisms, suggesting its use in treating infectious diseases caused by these pathogens.
16.	<i>Brahmi</i> <sup>27</sup> <i>Bacopa monnieri</i> (L.) Wettst. PLANTAGINACEAE	Alcoholic and Hexane extract	Exhibits antioxidant properties by inhibiting lipid peroxidation.
17.	<i>Ashwagandha</i> <sup>28,29</sup> <i>Withania somnifera</i> (L.) Dunal SOLANACEAE	Aqueous root (Mice and rabbits, 100 mg/kg orally)	Prevented the increase in lipid peroxidation (LPO) induced by lipopolysaccharides (LPS) from <i>Klebsiella pneumoniae</i> and peptidoglycans (PGN) from <i>Staphylococcus aureus</i> .
		Glycowithanolides and sitoindosides IX and X compound Swiss mice and Wistar Albino rats (50-200 mg/kg)	Induced a statistically significant activation and mobilization of peritoneal macrophages, enhanced phagocytosis, and increased lysosomal enzyme activity.
18.	<i>Jivanti</i> <sup>30,31</sup>	Methanolic extract (Rats)	Demonstrated significant free radical scavenging activity against DPPH, hydroxyl, and nitric oxide radicals.

	<i>Leptadenia reticulata</i> (Retz.) Wight & Arn. APOCYNACEAE	Whole plant Aqueous extract Swiss Albino Mice	Provided significant protection against immunosuppression induced by chromate (VI).
19.	<i>Shalparni</i> <sup>32</sup> <i>Pleurolobus gangeticus</i> (L.) J.St.-Hil. ex H.Ohashi & K.Ohashi FABACEAE	<i>Aqueous root extract</i> (Rat heart, 50 and 100 mg/kg, once daily for 30 days)	Enhanced enzymatic activity of superoxide dismutase (SOD), catalase, and glutathione peroxidase (GPx), while reducing lipid peroxidation.
20.	<i>Varahikanda</i> <sup>33</sup> <i>Dioscorea bulbifera</i> L. DIOSCOREACEAE	<i>Dioscorea bulbifera</i> polysaccharides (DBLP) (100 or 150 mg/kg) U14 cervical tumor-bearing mice	The combination of DBLP and Cyclophosphamide (CTX) enhanced the antitumor effect of CTX, while also mitigating CTX-induced immunosuppression and oxidative stress in U14 cervical tumor-bearing mice.
21.	<i>Beejaka</i> <sup>34</sup> <i>Pterocarpus marsupium</i> Roxb. FABACEAE	Acetone, IPA and Ethanol extract of stem wood DPPH scavenging method assay	Demonstrated dose-dependent antioxidant activity, with acetone and IPA extracts exhibiting higher radical scavenging properties (IC <sub>50</sub> – 36.5 µg/ml) compared to the ethanol extract (IC <sub>50</sub> – 61.94 µg/ml).
22.	<i>Vidarikanda</i> <sup>35</sup> <i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC. FABACEAE	Methanolic and Hexane tuber extract	The methanolic extract showed superior activity compared to the hexane extract in scavenging hydroxyl radicals and preventing lipid peroxidation.
23.	<i>Peelu</i> <sup>36</sup> <i>Salvadora persica</i> L. SALVADORACEAE	Hydroalcoholic and Aqueous extract	Demonstrated significant radical scavenging activity against DPPH, ABTS, NBT, and superoxide radicals, as well as effectively reducing ferric ions.
24.	<i>Vridhdharu</i> <sup>37,38</sup> <i>Argyreia nervosa</i> (Burm.f.) Bojer CONVOLVULACEAE	Ethanolic extract of dried root Mice (50, 100 and 200 mg/kg)	Stimulated both cellular and humoral immunity, significantly increasing the production of circulating antibody titers in response to sheep red blood cells.
		Ethanol extract and ethyl acetate extract of root Rats (200 mg and 400 mg/kg)	Exhibited antioxidant activity, counteracting oxidative stress in rats.
25.	<i>Punarnava</i> <sup>39,40</sup> <i>Boerhavia diffusa</i> L. NYCTAGINACEAE	Alkaloidal fraction Mice (25–100 mg/kg)	Inhibited delayed hypersensitivity reactions induced by SRBC in mice. Demonstrated a significant, dose-dependent increase in antibody titre during both pre- and post-immunisation treatment.
		Ethanol and Methanol extract	Both extracts exhibited significant antioxidant activity by reducing ferric ion and scavenging hydrogen peroxide, showing greater potency compared to the standard antioxidant, ascorbic acid.
26.	<i>Bala</i> <sup>41</sup> <i>Sida cordifolia</i> L. MALVACEAE	Methanol extract HepG-2 cells	After 48 hours of exposure, the methanol extract significantly increased the activity of antioxidant enzymes, including superoxide dismutase, catalase, and glutathione S-transferase, in HepG-2 cells.



benefits of these Ayurvedic medicines. Integrating these insights into mainstream medicine could offer broader therapeutic options, particularly in managing chronic diseases and promoting overall well-being through natural and holistic approaches.

## CONCLUSION

All the above research outcomes proved that *Rasāyana* has a valid role to play in maintaining and preserving health. It has the ability to reduce the occurrence of certain illnesses and, as a result, lessen the burden of health care. The current health care system policy will address raising public awareness of its usefulness, as the time has come to place greater emphasis on disease prevention.

*Rasāyana* is a special technique that is used as rejuvenating recipes, dietary regimens, and unique conduct and behaviour that promotes health rather than just being a pharmacological therapy. Research has demonstrated the usefulness of *Rasāyana* medicaments in treating ailments associated with a chronic lifestyle and degenerative changes. According to reports, they are nutritional supplements that work as antioxidants and rejuvenators, and they also have an antagonistic effect on oxidative stresses. It also plays a role in maintaining health, decelerating the aging process, and boosting the immune system to protect against infections. *Rasāyana* is

highly beneficial for preserving psychosomatic well-being in the current environmental and sedentary lifestyle.

As the time has come to place greater emphasis on illness prevention, the current health care system policy should address public awareness of *Rasāyana* usefulness. Individuals place a high value on their quality of life, so Ayurvedic research studies should also identify important areas in which it can be applied. To facilitate the inclusion of *Rasāyana* therapy in national healthcare strategies, comprehensive evidence and suggestions are needed, ensuring Āyurveda's meaningful contribution to the advancement of global health and well-being.

**Conflict of Interest:** Nil

## REFERENCES

1. Prof.D.S. Lucas. Bhavaprakasa Nighantu. Chaukhambha Visvabharati, Varanasi.2017
2. Dr. Jharkhande Ojha and Dr. Umapati Mishra. Dhanvantari Nighantu, Chaukhambha Vidya Bhawan. 2018
3. Acharya Priyavrat Sharma, Dr. Guru Prasad Sharma. Kaidev Nighantu. Chaukhamba orientalis, Varanasi. 2013
4. Dr. Satish Chandra Sankhyadhar. Raj Nighantu. Chaukhambha Orientalia, Varanasi. 2012

5. Dr.J.L.N. Sastry. Madanpala Nighantu. Chaukhambha Orientalia, Varanasi, 2010
6. Acarya Sodhala. Sodhala Nighantu. Chowkhambha Krishnadas Academy. 2019
7. Amrit Pal Singh. Madanadi Nighantu. Chaukhambha Orientalia, Delhi, 2022
8. Babu YK, Saraswathi P, Vijayaraghavan R, Mohanraj KG, Priya VV. Effect of *Convolvulus pluricaulis* aqueous extract on behavioural changes and antioxidants in stress-induced rats. *Int J Res Pharm Sci.* 2018;9(2):353–7.
9. R. Bellamkonda, K. Rasineni, S. R. Singareddy et al., “Antihyperglycemic and antioxidant activities of alcoholic extract of *Commiphora mukul* gum resin in streptozotocin induced diabetic rats,” *Pathophysiology*, vol. 18, no. 4, pp. 255–261, 2011.
10. Augusti KT. Therapeutic values of onion (*Allium cepa* L.) and garlic (*Allium sativum* L.). *Indian J Exp Biol.* 1996;34(7):634–40.
11. Liu, H Liu HG, Xu LH. Garlic oil prevents tributyltin-induced oxidative damage in vivo and in vitro. *J Food Prot.* 2007;70(3):716–21.
12. Syed SD, Deepak M, Yogisha S, Chandrashekar AP, Muddarachappa KA, D’Souza P, et al. Trypsin inhibitory effect of wedelolactone and demethylwedelolactone. *Phytother Res.* 2003;17(4):420–1.
13. Kaswala R, Patel V, Chakraborty M, Kamath JV. Phytochemical and pharmacological profile of *Gmelina arborea*: An overview. *Int Res J Pharm.* 2012;3(2):61–4.
14. Sunila ES, and Kuttan G, Immunomodulatory and antitumor activity of fruits of *Piper longum* L. and piperine, *J Ethnopharmacol*, 90(2-3), 2004, 339-346.
15. Ulbricht C, Armstrong J, Basch E, Basch S, Bent S, Dacey C, Dalton S, Foppa I, Giese N, Hammerness P, Kirkwood C, Sollars D, Tanguay-Colucci S, Weissner W (2008). An evidence-based systematic review of *Aloe vera* by the Natural Standard Research Collaboration. *J. Herb. Pharmacother.* 7:279-323.
16. Shyur LF, Tsung JH, Chen JH, Chiu CY, Lo CP. Antioxidant properties of extracts from medicinal plants popularly used in Taiwan. *Int J Appl Sci Eng* 2005; 3:195-202.
17. R. Govindarajan, N. Srividya, M. Vijaykumar, M. Thakur, V. K. Dixit, S. Mehrotra, and P. Pushpangadan. In vitro antioxidant activity of *Chlorophytum borivilianum*. *Natural Product Sciences.* 11:165–169 (2005).
18. Dahanukar S, Thatte U, Pai N, Mose PB, Karandikar SM. Protective effect of *Asparagus racemosus* against induced



- abdominal sepsis. Indian Drugs 1986; 24: 125-128.
19. Thatte U, Chhabria S, Karandikar SM, Dahanukar S. Immunotherapeutic modification of *E. coli* induced abdominal sepsis and mortality in mice by Indian medicinal plants. Indian Drugs 1987; 25: 95-97.
  20. H.N. Shivaprasad, M.D. Kharia, A.C. Rana, S. Mohan. Preliminary immunomodulatory activities of the aqueous extract of *Terminalia chebula*. Pharm. Boil., 44 (1) : 32-34 (2006).
  21. Naik GH, Priyadarsini KI, Naik DB, Gangabthagirathi R, Mohan H. Studies on the aqueous extract of *Terminalia chebula* as a potent antioxidant and a probable radioprotector. Phytomedicine. 2004; 11 (6): 530–538.
  22. Sai Ram M, Neetu D, Yogesh B, Anju B, Dipti P, Pauline T, Sharma SK, Sarada SK, Ilavazhagan G, Kumar D, Selvamurthy W. Cyto-protective and immunomodulating properties of Amla (*Embllica officinalis*) on lymphocytes: An in-vitro study. J Ethnopharmacol 2002; 81(1):5-10.
  23. Wand D, Famei H, Jiang Z., Osteoblastic proliferation stimulin activity of *Psoralea corylifolia* extracts and two of its flavonoids. International immunopharmacology. 2001; 1: 1849 - 1855.
  24. Upadhyaya R, Pandey RP, Sharma V, Verma Anita K. Assessment of the multifaceted immunomodulatory potential of the aqueous extract of *Tinospora cordifolia*. Res J Chem Sci. 2011;71-9.
  25. Jayaprakash R, Ramesh V, Sridhar MP, Sasikala C. Antioxidant activity of ethanolic extract of *Tinospora cordifolia* on N-nitrosodiethylamine (diethyl nitrosamine) induced liver cancer in male Wister albino rats. J Pharm Bioallied Sci. 2015;7(S1):S40.
  26. MA. Hanifa. Evaluation of Immunostimulant Potential of *Solanum nigrum* using fish, *etroplus suratensis* challenged with *aphanomyces*: International Journal of Pharma and Bio Sciences, 2011; 2(1): 7.
  27. Tripathi YB, Chaurasia S, Tripathi E, Upadhyay A, Dubey GP. *Bacopa monniera* Linn. as an antioxidant: mechanism of action: Indian J. Exp. Biol. 1996; 34:523-526.
  28. Dhuley JN. Effect of ashwagandha on lipid peroxidation in stress-induced animals. J Ethnopharmacol 1998;60:173-178.
  29. Ghosal S, Lal J, Srivastava R, et al. Immunomodulatory and CNS effects of sitoindosides IX and X, two new glycowithanolides from *Withania somnifera*. Phytotherapy Res 1989;3:201-206.

30. Wakade, A.S.; Juvekar, A.R.; Hole, R.C.; Nachankar, R.S.; Kulkarni, M.P. Antioxidant and cardioprotective effect of *Leptadenia reticulata* against adriamycin-induced myocardial oxidative damage in rat experiments. *Planta Med.* 2007, 73, 443.
31. Girishkumar, V.; Sreepriya, M.S.; Praveenkumar, S.; Bali, G.; Jagadeesh, M.S. Modulating effect of *Leptadenia reticulata* (Retz) Wight & Arn against chromate (VI)-induced immunosuppression and oxidative stress on mouse splenic lymphocytes and bone marrow derived macrophages. *J. Ethnopharmacol.* 2010, 131, 505–508.
32. Kurian GA, Rajamani T, Ramanarayanan P, Paddikkala J. A comparative study on in vitro and in vivo antioxidant activities of aqueous extract of *Desmodium gangeticum* (Leguminosae) root. *Int J Green Pharm.* 2009; 3(4):324-31. <https://doi.org/10.22377/ijgp.v3i4.110>
33. Hongxia Cui, Ting Li, Liping G Wang, Yan Su & Cory J. Xian, *Dioscorea bulbifera* Polysaccharide and cyclophosphamide combination enhances anti-cervical cancer effect and attenuates immunosuppression and oxidative stress in mice, article no.19185, jaqn2016.
34. Abirami B, Gayathri P, Uma D. *Int J of Chem & Phar Sci*, 2012; 3(2):17-24.
35. Pandey, N., Chaurasia, J. K., Tiwari, O. P., and Tripathi, Y. B. (2007). Antioxidant properties of different fractions of tubers from *Pueraria tuberosa* Linn. *Food Chem.* 105 (1), 219–222. doi:10.1016/j.foodchem.2007.03.072.
36. Arora S, Kaushik D, Free radical scavenging activity of *Salvadora persica* Linn., *Asian Journal of Chemistry*, 2007, Vol.19 (6), 4638,4644.
37. Gokhale AB, Damre AS, Saraf MN. Investigations into the immunomodulatory activity of *Argyrea speciosa*. *J Ethnopharmacol* 2003;84:109-14.
38. Habbu P, Shastri R, Mahadevan KM, Joshi H, Das S. Hepatoprotective and antioxidant effects of *Argyrea speciosa* in rats. *Afr J Tradit Complement Altern Med* 2008;5:158-64.
39. Mungantiwar AA, et al. Studies on the Immunomodulatory Effects of *Boerhaavia diffusa* Alkaloidal Fraction. *Journal of Ethnopharmacology* 1999; 65:125–131.
40. Rachh PR, Rachh MR, Modi DC, Shah BN, Bhargava AS, Patel NM, Rupareliya MT. Invitro Evaluation of Antioxidant Activity of *Punarnava* (*Boerhaavia diffusa* Linn.) *International Journal of Pharmaceutical Research* 2009; 1(1):36-40.
41. Pieme CA, Penlap VN, Ngogang J, Costache M. In vitro cytotoxicity and antioxidant activities of five medicinal plants of Malvaceae family from Cameroon. *Environ Toxicol Pharmacol* 2010; 29: 223-8.