Review Article

Anti-Oxidant Activity perspectives in *Rasayana Karma*

Sushama B Bhuvad, K Nishteswar

Journal of Indian System of Medicine

Abstract:

Acharya Charaka stated about two types of medicine, one which promotes resistance to the body and another which cures the diseases. *Rasayana* and *Vajikarana* therapies play a key role in achieving these goals. The main aim of *Rasayana* therapy is to promote formation of *Ojasa* or resistance which in modern terminology can be called as promoting the strength of immune system. In the present study, review of the *Rasayana* drugs had been made from *Rasayanachikitsa* of Ayurveda classics. They are furnished on the basis of definition of *Rasayana* stated by *Acharya* Bhavamishra. There are total 158 herbal *Rasayana* drugs proven for their antioxidant activity and are categorized according to their actions. A total of 12 activities were found to be common in majority of drugs i.e. *Vrishya, Chakshushya, Brihmana, Deepana, Pachana, Keshya, Swarya, Hridya, Balya, Medhya- Smritida* and *Jeevaniya.* Some of the activities like *Vrishya, Hridya, Medhya, Deepana* and *Pachana* can be scientifically validated. But other activities like *Chakshushya, Keshya, Swarya* require proper scientific method of evaluation.

Key words: Antioxidant activity, *Rasayana* Karma, Herbal drugs

Introduction:

There are many misconceptions regarding cure or prevention of disease. It can be thought that all the diseases can be prevented by immunization or by any physico-chemical methods or else the health will be automatically promoted if proper nutrition is given. Modern scientists feel that one cannot improve health of the person more than what is genetically determined for him. However, it can be contradicted by research of Linus Pauling. Pauling's promotion of large doses of vitamins for everything from the common cold to cancer has often gone beyond the available evidence. However, in more recent years, re-evaluations of Pauling's work have shown that dietary supplementation with antioxidants such as vitamin C can have significant beneficial effects on health. Pauling's ideas about molecular balance and health are increasingly important to a health-conscious public, as well as to a growing number of health professionals [1].

Rasayana is considered as one of the *Angas* (part) of the *Ashtanga* Ayurveda. *Acharya* Charaka had described *Rasayanachikitsa* to fulfill the aim of the Ayurveda i.e. *Swasthasya Swasthya Rakshanam*. *Rasayana* drugs acts by preventing the old age and diseases in the healthy person. E.g *Haritaki, Guggulu* and *Shilajatu* [2]. *Acharya* Sushruta quoted about *Rasayana* as the drug having potential for *Vayasthapana* (Anti-

Joinsysmed ID: JID027RA150330
Submitted Date: 07/03/2015
Approved Date: 20-07-2015
Corresponding Author:
Sushama B Bhuvad, PhD scholar, Dept. of Dravyaguna, I.P.G.T.&R.A, Jamnagar
Email: bsushama87@gmail.com
Co-author (s):
K Nishteswar, Prof & HOD, Dept. of Dravyaguna, I.P.G.T.&R.A, Jamnagar
Conflict of Interest: NIL
Source of Support: NIL
Ethical Clearance: NA
Registered to: NA
Acknowledgment: NA
How to cite the article:
Sushama B Bhuvad, K Nishteswar, Anti-Oxidant Activity perspectives in Rasayana Karma, Joinsysmed vol 3(2), pp 69-81

ageing), *Ayushyakara* (Invigorating), *Medhya* (Memory booster), *Balakara* (Strength promoting) and *Rogahara* (cure of disease) activities [3]. *Acharya* Bhavamishra defines *Rasayana* as the medicine which prevents old age, cures diseases, acts as *Vayasthapana* (retards ageing), *Chakshushya* (eye tonic), *Brihmaneeya* (increases bulkiness of the body) and *Vrishya* (aphrodisiac) [4].

On scientific basis, *Rasayana Karma* can be analogous with Anti-oxidant, Anti-ageing, Adaptogenic, Nootropic and cognitive, immunomodulatory activities. The anti-oxidant agent decreases the cell destruction activity of free radical and promotes cell longevity. Adaptogenic drugs help to adopt the body for various types of stress (environmental, physical, mental etc.). The drugs supplements, nutraceuticals and functional foods that enhance attention, control and memory are called as cognitive enhancers. Immunomodulatory drugs modulate the immune system. Anti-ageing drugs slow down the ageing process in the body.

By taking into considerations the different views about the definition of *Rasayana*, the review of the drugs was done considering 11 activities i.e. *Vrishya, Chakshushya, Brihmana, Deepana, Pachana, Keshya, Swarya, Hridya, Balya, Medhya- Smritida, Jeevaniya* with regard to *Rasayana* activity.

Material and Method:

Rasayana drugs were compiled from the Charaka samhita, Sushruta samhita, Ashtanga hridaya, Ashtanga samgraha, Harita samita, Bhavaprakasha, Sarangadhara, and Gadanigraha. Drugs were identified with the help of commentaries of these classical texts, and "Glossary of Vegetable drug in Bruhattrayi" by Thakur Balawant Singh. The actions of drugs are compiled from Bhavaprakasha nighatu, Kaiyadeva nighantu, Raja nighantu and Rasatarangini. The research activities reported about these drugs has been collected from 'Selection of Prime Ayurvedic Plant Drugs' by Sukh Dev as well as relevant articles have been downloaded from Google scholar.

Observation and Result:

Upon screening the above mentioned Ayurvedic compendia a total of 158 drugs possessed *Rasayana* property which were categorized according their actions. In total 20 drugs having *Rasayana* karma, 29 drugs are having *Vrishya* karma, 12 are *Chakshushya* drugs, 11 drugs are having *Brihmana Karma*, 29 are *Balya* drugs, 15 are *Medhya* drugs and 4 are *Jeenvaniya* drugs. Apart from these actions, other actions like *Deepana* (Digestive stimulant), *Pachana* (promotes digestion), *Keshya* (Hair tonic), *Swarya* (beneficial to voice) and *Hridya* (Cardioprotective) are also found to be attributed to these drugs.(see the tabulations)

There are 12 drugs mentioned in *Rasayana chikitsa* which possess *Chakshushya* property.

1. *Ajaaji,*
2. *Haritaki,*
3. *Draksha,*
4. *Lodhra,*
5. *Madhuka,*
6. *Mudgaparni,*
7. *Lashuna,*
8. *Mudga*,
9. *Nimbapatra,*
10. *Nirgundi,*
11. *Shatavari,*
12. *Aparajita*

Rasayana drugs attributed with *Deepaniya* activity are as follows:

1. *Agnimantha*
2. *Ajaji*
3. *Ajamoda*
4. *Apamarga*
5. *Ativisha*
6. *Bijapura*
7. *Bhallataka*
8. *Bharangi*
9. *Danti*
10. *Dhanyaka*
11. *Ela*
12. *Gokshura*
13. *Guduchi*
14. *Guggulu*
15. *Haritaki*
16. *Hribera*
17. *Indrayava*
18. *Krishnajeeraka*
19. *Kantakari*
20. *Karchoora*
21. *Katuki*
22. *Maricha*
23. *Musta*
24. *Patola*
25. *Pippali*
26. *Saptaparna*
27. *Shatavari*

28. *Shyonaka*
29. *Surana*
30. *Surasa*
31. *Vacha*
32. *Varahi*
33. *Vidanga*
34. *Yava*
35. *Yavani*

The drugs attributed with *Pachana* property are as follows:

1. *Apamarga*
2. *Ativisha*
3. *Bharangi*
4. *Bilva*
5. *Brihati*
6. *Chitraka*
7. *Dhanyaka*
8. *Hingu*
9. *Hribera*
10. *Krishnajeeraka*
11. *Kantakari*
12. *Lashuna*
13. *Musta*
14. *Nagakesara*
15. *Ushira*
16. *Patola*
17. *Shunthi*
18. *Yavani*

In total 11 drugs having *Rasayana* along with *Brihmana* property. They are listed below: *Bhallataka*
Kadali
Kapikachhu
Lashuna
Madhooka
Masha
Mushali
Shaali
Shalaparni
Talamuli
*Vidari*There are total 10 *Rasayana* drugs attributed with *Keshya* property ad they are as follows: *Asana*
Bakuchi
Bhallataka
Bhringaraja
Bibhitaka
Gambhari
Krishna Tila
Madhuka
Nilika
Nirgundi

In total seven drugs are possessing *Kanthya* property, they are mentioned below:
Guggulu
Kakamachi
Madhuka
Shali
Shunthi
Vasa
Yava

In total 29 drugs listed for their *Rasayana* and *Balya* activity. And they are as follows:
Ajaji
Ajamoda
Ashwagandha
Atibala
Bala
Bhringaraja
Bilva
Guduchi
Guggulu
Kapikachu
Kharjura
Krishnajeeraka
Krishnatila
Lashuna
Madhooka
Madhuka
Mahashatavari
Masha
Mashaparni
Nagabala
Palandu
Priyangu
Shali
Shankhpushpi
Shatavari
Tugakshiri
Varahi
Vidari
Yava

Chakrapani interprets that the word '*Jivaniya'* means '*Ayu'* and the drug/diet that it *Hitakara* (Conductive for sustenance of life) is *Jivaniyanam* [56]. Bhadanta Nagarjuna described that *Jivaniya* drug usually constituted by *Prithvi* and *Jalamahabhuta*. Doctrine of Ayurvedic physiology attributed *Jivanam* as main *Karma* of *Rakta dhatu*. Basing on this concept, the mode of action of *Jivaniya* drugs can be explained on *Raktadhatu*. Site of action (*Adhikarana*) of *Jivaniya* drugs usually is *Raktadhatu* and the drugs may help to improve the total constituents of *Rakta*. There are only 4 drugs namely *Haritaki, Varahi, vidari* and *Kshiravidari* attributed for their *Rasayana* and *Jeevaniya* property.

Discussion:

In the Ayurvedic pharmacology, *Rasayana*

Karma may include in total 11 activities which are discussed sequentially as according to modern pharmacology, *Rasayana Karma* may be correlated with antioxidant, adaptogenic, anti-stress, anti-ageing activities etc.

The part of activity of *Rasayana Karma* may be interpreted with antioxidant activity or free radical scavenging activity. Antioxidants are reducing agents, and limit oxidative damage to biological structures by passivating them from free radicals. Free radicals accumulate in the cell as the age progresses. They are highly unstable and reactive in nature and cause oxidative chain reaction. The free radical oxidation moves from molecule to molecule, cell to cell and causes immense damage to human body [57]. Among 20 drugs, 18 are already reported for their antioxidant activity. *Bakuchi* and *Mahashatavari* are yet to be validated for their antioxidant or free radical scavenging activity. (Table 1) Drugs like *Shatavari*, *Ashwagandha, Mushali* increases libido and may be called as *Vajikara* or *Vrishya dravya*. About the mode of action aphrodisiac drugs Bhavamishra states that these drugs act by their *Prabhava* (specific potency) just like *Virechana dravyas* (Purgative drugs). E.g. *Dugdha, Masha, Bhallataka* and *Amalaki* are said to be producer and expellers of *Shukra* (Semen) [58]. Among the 29 drugs, 11 drugs like *Pippali, Shankhpushi, Shali* are not validated for their aphrodisiac activity though they possess *Vrishya* property. According to modern phytochemistry, flavonoids and others phenolics compounds; alkaloids, xanthins and others amines; and saponins may responsible for the aphrodisiac activity [59]. These drugs improve sexual behavior, spermatogenesis; increase sperm count and testosterone level.

Some drugs like *Krishnajeerka, Padma* seed and *Patola* seed show anti-fertility activity. The use of anti-fertility agent or Contraceptive pills in developing countries is estimated to have decreased the number of maternal deaths by 40% (about 270,000 deaths prevented in 2008) and could prevent 70% of deaths if the full demand for birth control were met [60]. These benefits are achieved by reducing the number of unplanned pregnancies that subsequently result in unsafe abortions and by preventing pregnancies in those at high risk, which ultimately result in improvement or increase in life span of human being. (Table 2)

It is generally stated that *Hridya* refers to group of drug which promotes the strength of the heart [61]. But Gangadhar, commentator on Charaka samhita, expressed it as the drugs which can be good for mind or which also act at psychic level [62]. Mostly *Amlarasa* is attributed with *Hridya karma*. There are 15 drugs, reported for their antioxidant activity and possess *Hridya* activity too. Among them only 5 drugs are proven for their cardioprotective activity. (Table 3)

A drug which increases the *Budhhi* (intelligence) is known as *Medhya* [63]. This word is interpreted as intellect promoting or brain tonic by *Acharya* Priyavrat Sharma [64]. *Acharya* Nagarjuna opines that *Medhya Karma* may be attributed to *Prabhava* [65]. *Medha* faculty includes power of acquisition, retention and recollection (memory). There are 10 drugs, reported for their nootropic and cognitive, anti-amnesic activities. (Table 4)

The drug which is good to eye sight is called as *Chakshushya*. *Pitta* (*Alochaka pitta*) does the function of maintenance of eye sight and *Kapha* is responsible to strengthen the eye. Therefore vitiation of *Pitta* and *Kapha Dosha* can cause various eye diseases. The drugs which alleviate vitiation of *Kapha* and *Pitta Dosha* and strengthen the eye sight should be administered. The drugs containing tannins, flavonoids, Vit.A, B, C, and zinc contents can improve the eye sight. Tannin containing drugs like *Haritaki* can be used in inflammatory conditions e.g. conjunctivitis etc., flavonoids can perform antioxidant activity and drugs like *Cuminum cyminum* which contains zinc can help in normal functioning of lens, retina to stop diseases like night blindness and macular degeneration [66].

In total 35 drugs having *Rasayana* as well as *Deepana* property. *Deepana* drugs stimulate *Agni* (digestive fire). *Agni* can be *Jatharagni, Dhatvagni* or *Bhutagni*. Hence, to exercise *Rasayana* property, the drug should act not only on *Jatharagni* but also at *Dhatvagni* level to generate normal *dhatus*. Sushruta considered *Agni* predominant dravya as *Deepaniya* [67]. Therefore drugs having *Amla* and *Katurasa* may possess *Deepaniya* activity e.g. *Bijapuraka, Ajaji, ajamoda, Yavani, Vidanga, Maricha* etc.

The drug which digests *Ama* but does not directly stimulate the *Agni* is *Pachaniya* [68]. Arunadatta quoted that which increases the digestive power of Agni is known as *Pachana*. The drugs should be of *Akasha, Vayu* and *Agni mahabhuta* dominance. Therefore *Tikta, Katu Rasa* can cause digestion of undigested material due to their *Sukshma* (Subtle), *Tikshna* (Penetrating), *Ushna* (Hot), *Laghu* (easy to digest) properties. There are in total 18 drugs mentioned in *Rasayana chikitsa* having *Pachana* property too.

Measures that increases bulkiness of the body is referred as *Brihmaneeya*. In a way *Brihmaneeya* drug promotes body weight and it possess the *Gunas* like *Guru, Mridu, Snigdha, Sandra, Sthula, Picchila, Manda, sthira* and *Shlakshna* [69]. *Brihmaneeya Dravyas* are mainly constituted by *Prithvi mahabhuta*. Sushruta opines that *Brihmaneeya* drug is constituted by *Prithvi* and *Jala Mahabhutas* [70]. Site of action of *Brihmaneeya* drugs is predominantly on *Mamsadhatu* and if it happens to be *Kaphakara* drugs it may exert its action on rests of the *dhatus* like *Rasa*, *Meda*, *Majja* and *Shukradhatu*.

Keshya drugs act to fulfill both the purposes i.e. Growth of hairs and color of the hair. Loss of the hairs can occur in skin diseases like *Indralupta, Khalitya, Darunaka* and also due to endocrinal diseases like hypothyroidism. In such conditions, *Vata*, *Pitta*, *Kapha* as well as *Rakta* also get vitiated. Vitiated *Vata, Pitta* causes hair fall and *Kapha* causes obstruction at opening of hair follicle which further stops their growth. Therefore the drugs having *Ushna, Tikshna*, *Snigdha, Sukshma* attributes can be administered. E.g. *Asana, Bibhitaka, Bhallataka, Nirgundi.* Another burning problem i.e. greying of hairs at early age can be overcome by natural coloring agents like *Bhringaraja, Nili, Krishna tila* etc. Site of action of the drug should be *Meda*, *Asthi dhatu* because *Kesha* is *mala* of *Asthi dhatu* [71].

The drug which acts on voice is called as *Kanthya* or *Swarya*. The diseases related to *Kantha* are mainly due to vitiation of *Vata, Kapha* and *Rakta doshas.* The drugs having *Tikta, Katu* rasa, *Ushna*, *Tikshna Guna* can be used in *Vata-kaphaja* conditions. E.g. *Shunthi, Guggulu.* But in case of vitiation of *Rakta*, drugs having *Sheeta* potency should be administered. E.g. *Vasa, Madhuka*. Another feature of these drugs is to improve voice. The drug should act on *Majja Dhatu* for improvisation of voice. As "*Snigdha Swara*" and "*Prasanna Swara*" are symptoms of *Majjadhatusara* and *Shukradhatusara* individuals respectively [72]. Ultimately these drugs show their action up to *Shukra dhatu* therefore they would act as *Rasayana*.

Kapha is normal state imparts *Bala* [73] (strength) to the body which is also referred by the name *Shaishmika ojas*. *Bala* is measured by physical exercise. *Bala* is also interpreted as immunity. Five *dhatus* are belonging to *Kapha varga*.i.e. *Rasa, Mamsa, Meda, Majja* and *Shukra* may serve as site for action of *Balya* drugs. *Balya dravyas* are often interpreted as tonics and strength promoters or immune enhancers. Charaka samhita's Vidyotini commentator classifies *Balya* drugs into two groups 1. General drugs- promote the general strength. E.g. *Kapikachhu, Shatavari*. 2. Specific drugs- Certain drugs specifically increase the strength of the organ or toned up the organ. E.g. *Hridaya- Arjuna*; *Amashaya-Shatavari*; *Nadisamsthana- Lashuna, Garbha sthapana*: *Kapikachhu, Vidari* etc.

Conclusion:

In total 158 herbal drugs are enumerated from the *Rasayana* therapy basing on eight important *Samhita* and *Yogasamgraha granthas* and classified them further into different groups like *Vrishya*, *Chakshushya*, *Brihamana* etc. basing on the definition furnished by Bhavamishra to *Rasayana Karma*. A critical analysis to data clearly indicates that maximum number of drugs is attributed with *Deepana*, *Vrishya* and *Balya* activities. In total 142 drugs have exhibited antioxidant activity, which is preferred as one of the pharmacological expression of *Rasayana Karma*. It appears that *Rasayana Karma* is exhibited by influencing the *Agni* (*Jatharagni*, *Dhatwagni*, and *Bhutagni*) and *Bala* (contributed by *Kapha* with its five *dhatus* namely *Rasa, Mamsa, Meda, Majja* and *Shukra*) simultaneously.

Vrishya, Chakshushya, Brihmana, Deepana, Pachana, Keshya, Swarya, Hridya, Balya, Medhya-Smritida, Jeevaniya activities are attributed to drugs included in the *Rasayana* therapy. These can be categorized as General *Rasayana* like *Balya, Brihmana, Deepana, Pachana, Jeevaniya;* and

specific organ wise *Rasayana* like *Keshya, Swarya, Hridya, Medhya, Smritida, Vrishya, Chakshushya*. Certain activities like *Hridya, Vrishya, Medhya* can be interpreted as Cardioprotective activity, Aphrodisiac, Nootropic and Cognitive activities respectively. But other activities like *Chakshushya, Keshya, Brihmana, Balya* etc. require methods to evaluate it scientifically. Degenerative changes in different organs due to oxidative stress may be controlled by *Rasayana* drugs with proven antioxidant activities.

References:

[1] http://profiles.nlm.nih.gov/ps/retrieve/Narrative/MM/p-nid/57 dt.18.03. 2015

[2] Bhavamishra, Bhavaprakasha samhita, Purvakhanda 6/229; edited by Sri Brahmshankar Mishra, 11th Edition, Varanasi: Chaukhambha Sanskrit Bhavan; 2010, p.195

[3] Sushrut, Dalhana, Sushrutasamhita , Sutrasthana 1/7 (7); Edited Vd. Yadavaji Trikamji, Reprint, Varanasi: Chaukhambha Surabharati Prakashan; 2008 , p.3

[4] Bhavamishra, Bhavaprakashasamhita, Uttarakhand 73/1; Edited by Sri Brahmashankar Mishra, 11th Edition,Varanasi: Chaukhambha Sanskrit Bhavan; 2010

[5] Gupta Priya Nain Parminder, Sidana Jaspreet. Anti-microbial and anti-oxidant activity on Emblica officinalis seed extract, IJRAP, Jul-Aug 2012; 3(4):591-596

[6] Yeole P G, Wadher S J, Gaikwad N J. Free radical scavenging activity of water extract of heartwood of *Pterocarpus marsupium*, Journal of Natural Remedies, 2008; Vol 8(1):89-92

[7] K Prabhu, S Shankarlal, E Natarajan, A Mohammad Sadiq. Anti-microbial and Anti-oxidant activity of methanolic extract of Eclipta alba, Advances in Biological Research, 2011; 5 (5): 237-240

[8] Ghosh Tirtha, Maity Tapan Kumar, Das Mrinmay, Bose Anindya, Dash Deepak Kumar. In Vitro anti-oxidant and Hepatoprotective activity of ethanolic extract of Bacopa monnieri L. aerial parts, IJPT, Jan 2007; Vol 6 (1): 77-85

[9] Nayak Bhabani S, Ellaiah P, Dinda Subas C. Anti-bacterial, anti-oxidant and anti-diabetic activities of *Gmelina arborea* Roxb. Fruit extract, International Journal of Green pharmacy, July-Sept 2012;Vol 6(3): 224-230

[10] Ramya Premanath and N. Lakshmidevi. Studies on Anti-oxidant activity of Tinospora cordifolia (Miers.) Leaves using in vitro models, Journal of American Science, 2010; 6(10): 736-743.

[11] Shah Darshan, M Nitin, Someshekhar S, K Sagar, L Dhananjay, K Yogesh. Anti-oxidant activity of Balsamodendron mukul Hook extract, Der Pharmacia Lettre, 2012; 4(5): 1501-1504

[12] G Alagumani Vasagam, Kottai Muthu, R Manavalan. Anti-oxidant potential of methanolic extract of tuberous root of Ipomoea digitata (Linn)., Asian Journal of Chemistry, 2011;Vol 23 (3):1393-1394

[13] Singh Hari Pratap, Yadav Indranil Kumar, Jain D A. In vitro antioxidant activity of different extract of bulb of Allium sativum Linn, Elixir Applied Botany, 2012; 53:11873-11876.

[14] Rahman Mijanur, Hossain Shahdat, Rahaman Asiqur, Nusrat Fatima, Taslima Nahar, Borhan Uddin. Anti-oxidant activity of *Centella asiatica* (Linn). Urban; Impact of extraction Solvent polarity, Journal of Pharmacognosy and Phytochemistry, 2013;Vol 6(1):27-32

[15] Mehdi Farshad Ashraf, Maheran Abd Aziz, Johnson Stanslas, Ismanizan Ismail and Mihdzar Abdul Kadir. Assessment of Antioxidant and Cytotoxicity Activities of Saponin and Crude Extracts of *Chlorophytum borivilianum*, The Scientific World Journal, 2013; Vol 2013:1-7

[16] Joy Beena, Sandhya C P and Remitha K R. Comparison and Bio evaluation of *Piper longum* fruit extracts, Journal of Chemical and Pharmaceutical Research, 2010;Vol 2 (4):612-622

[17] Raghavan Govindarajan *et al.* Anti-oxidant activity of *Desmodium gangenticum* and its phenolics in arthritic rats, Acta Pharm. 2006; 56:489496.

[18] Verma S, Sinha R, Kumar P, Amin F, Jain J, Tanwar S. Study of *Convolvulus pluricaulis* for antioxidant and anticonvulsant activity, Cent Nerv Syst Agents Med Chem, Mar 2012; Vol 12 (1):55-59

[19] Lalana Kongkaneramit et al, Anti-oxidant activity and anti-apoptotic effect of *Asperagus racemosus* root extracts in human ling epithelial H460 cells, Exp. Ther Med, Jan-Feb 2011;2(1):143-148.

[20] Venukumar M.R., Latha M.S. Antioxidant activity of *Curculigo orchiodes* in Carbon tetrachloride induced hepatopathy in rats, Indian Journal of Clinical Biochemistry, 2002; 17 (2):80-87.

[21] Ghosh S, Derle A, Ahire M, More P, Jagtap S, Phadatare SD et al, Phytochemical analysis and free radical scavenging activity of medicinal plants Gnidia glauca and Dioscorea bulbifera. PLoS One, Dec 2013;Vol. 8 (12): e82529

[22] Pandey, N; Chaurasia, Jk; Tiwari, Op; Tripathi Yb. Antioxidant properties of different fractions of tubers from Pueraria tuberosa Linn. Food chemistry, 2007; 05(1): 219-222

[23] Pathak Pankaj, Guru Prasad B. R., Murthy N. Anjaneya and Hegde S. N. The effect of Emblica officinalis diet on lifespan, sexual behavior, and fitness characters in Drosophila melanogaster, Ayu. Apr-Jun 2011; 32(2): 279284.

[24] Gupta Anilkumar, Bindal M C, Gupta Santoshkumar, Prakash Dhirendra, Vedpal. Aphrodisiac activity of Semecarpus anacardium nut, International Research Journal of Pharmacy, 2013;4 (4):202-204

[25] Singh Surender, Nair Vinod, Gupta Yogendra K. Evaluation of the aphrodisiac activity of *Tribulus terrestris* Linn. in sexually sluggish male albino rats, J Pharmacol Pharmacother., Jan-Mar 2012; 3(1): 4347.

[26] Karthikeyan J S, Sankar Samipillai. Sugarcane In Therapeutics, Journal of Herbal Medicine and Toxicology, 2010; 4 (1):9-14.

[27] Agrahari Pooja, Singh D K. A review on the pharmacological aspects of Carum carvi, Journal of Biology and Earth Sciences, 2014; Vol 4 (1):1-3

[28] Yakubu MT, Oyeyipo TO, Quadri AL, Akanji MA. Effects of aqueous extract of Musa paradisiaca root on testicular function parameters of male rats, J Basic Clin Physiol Pharmacol. 2013; 24(2):151-7.

[29] Sharma Brijesh Kumar, Ahmad Shamim, Singh

Rahul, Verma Rajesh Kumar, Kumar Nilesh. A review on Mucuna pruriens: Its phyto constituents and therapeutic uses, Novel Science International Journal of Pharmaceutical Science, 2012;1(6):308 -312
[30] Al-Bekairi AM, Shah AH, Qureshi S, Effect of Allium sativum on epididymal spermatozoa, estradiol-treated mice and general toxicity, J Ethnopharmacol. May 1990; 29(2):117-25.
[31] Thakur, M. and Dixit, V.K. Effect of Chlorophytum borivilianum root extracts on androgenic and sexual behavior in male rats. Indian Drugs, 2006; 43(4):300-306.
[32] Vahitha BI S M, Banumathi V, Anbu J, Anjana ashwini, Pitchiah Kumara M. Aphrodisiac activity of Venthamarai Magarantha choornam (stamens of Nelumbo nucifera white variety) on healthy wistar albino rats, International Journal of Life science & Pharma Research, Oct-Dec 2012; Vol2 (4):44-50
[33] Mehta Nishakruti R, Patel Ekta, Patani Pragnesh, Shah Biren. Nelumbo nucifera (Lotus); A review on ethnobotany, Phytochemistry and Pharmacology, Indian Journal of Pharmaceutical and Biological Research, 2013; 1(4):152-167
[34] Goswami Sumanta Kumar, Inamdar Mohammed Naseeruddin, Pandre Manoj Kumar, Jamwal Rohitash, Dethe Shekhar, Erectogenic and Aphrodisiac Effects of *Butea frondosa* Koenig ex Roxb. in Rats: Involvement of Enzyme Inhibition, Evidence-Based Complementary and Alternative Medicine, 2013; Volume 2013:10 pages.
[35] Marya Bhavna H., Bothara S. B. Ethanopharmacological properties of *Cocculus hirsutus* (L) Diels- A review, International Journal of Pharmaceutical Sciences Review and Research, Vol 7 (1); Mar-Apr 2011:108-112
[36] Falasca AI, Abbondanza A, Barbieri L, Bolognesi A, Rossi CA, Stirpe F. Purification and partial characterization of a lectin from seeds of Trichosanthes kirilowii. Federation Eur Biochem Soc (FEB) 1989;246:15962
[37] Memudu, AE, Akinrinade ID, Ogundele, OM, Duru F. Investigation of the androgenic activity of ginger (Zingiber officinale) on the histology of the testis of adult sparague dawley rats, Journal of Medicine and Medical Sciences , Nov 2012;Vol. 3(11): 697-702
[38] Chauhan NS and Dixit VK .Spermatogenic activity of rhizomes of Curculigo orchioides Gaertn in male rats, International Journal of Applied Research in Natural Products, June/July 2008;Vol. 1(2):26-31.
[39] Kaikini Akruti A, Dhande Swati R, Kadam Vilasrao J, Overview of Indian medicinal tree: Bambusa bambos (Druce), International Research Journal of Pharmacy, 2013; 4(8):52-56
[40] A. Subramoniam, V. Madhavachandran, K. Ravi,V.S. Anuja. Aphrodisiac activity of the elephant creeper Argyreia nervosa, J. Endocrinol Reprod, 2011; Vol 11 (2):82-85.
[41] Sonawane Nilesh, Suryavanshi Ashutosh, Undale Vaishali, Bhosale Ashok. Evaluation of cardioprotective effect of aqueous extract of *Psoralea corylifolia* Linn. in isoproterenol-induced cardiac hypertrophy in rats, Poster presentation, IPS 2010.
[42] Kouchmeshky Azita, Seyed Behnamedin Jameie, Gholamreza Amin, Seyed Ali Zia. Investigation of Angiotensin-Converting Enzyme Inhibitory Effects of Medicinal Plants Used in Traditional Persian Medicine for Treatment of Hypertension: Screening Study, Thrita J Med Sci., January 2012; 1(1): 1323.
[43] Nagarathna P. K. M , S. Praveen Kumar, Sudheer.M. Cardioprotective Activity of Leaves of Cassia tora on Isoproterenol Induced Myocardial Injury, International Journal of Toxicological and Pharmacological Research 2013-14; 5(4): 121-128
[44] Nandave M, Ojha SK, Kumari S, Nag TC, Mehra R, Narang R, Arya DS. Cardioprotective effect of root extract of Picrorhiza kurroa (Royle Ex Benth) against isoproterenol-induced cardiotoxicity in rats, Indian J Exp Biol. 2013 Sep;51(9):694-701.
[45] Sood S, Narang D, Dinda DK, Maulik SK. Oral administration of Ocimum sanctum Linn. Augments cardiac endogenous antioxidant and prevents isoproterenol-induced myocardial necrosis in rats. J Pharm Pharmacol 57(1);2005:127-133
[46] Kunwar Teena, Neeraj Kumar, Kothiyal Preeti. Role of Spices In Neuropsychiatric Disorders, Indo American Journal of Pharmaceutical Research, 2014; 4(9):3746-3753
[47] Sankh Kuber Ashwini, H.S. Huded, Shiva Prasad, Lingadore K.Memory enhancing effect of gambhari phala (Gmelina arborea) in the electroshock induced amnesia in wistar albino rats- An Experimental Study, International Ayurvedic Medical Journal, Oct 2013;1(5):1-7
[48] B Ramesh, Rao R Lakshmana, V Sai Kishore.To Study The Influence of Ethanolic Extract of Terminalia chebula On Learning and Memory of Albino Rats, Inventi Rapid-Ethnopharmacology, Oct-Dec 2014;Vol (4).
[49] Koppula Sushruta, Kopalli Spandana Rajendra, Sreemantula Satyanarayana, Adaptogenic and nootropic activities of aqueous extracts of *Carum carvi* Linn (caraway) fruit: an experimental study in Wistar rats, Australian Journal of Medical Herbalism 2009;21(3):72-78
[50] Sharma Komal, Bhatnagar Maheep, Kulakarni S K. Effect of *Convolvulus pluricaulis* Choisy.and *Asparagus racemosus* Willd on learning and memory in young and old mice: A comparative evaluation, Indian Journal of Experimental Biology, 2010; 48: 479-485
[51] Chandu Baburao, Khagga Mukkanti, Challa Siva R, Dasari Varun. Evaluation of nootropic potential and in vitro antioxidant activity of aqueous extract of roots of Asparagus racemosus in rats, International Journal of Pharmaceutical Research and Development,2011;3(6):184-191
[52] Talpate KA, Bhosale UA, Zambare MR, Somani RS. Neuroprotective and nootropic activity of *Clitorea ternatea* Linn.(Fabaceae) leaves on diabetes induced cognitive decline in experimental animals, J Pharm Bioallied Sci. Jan 2014;6(1):48-55
[53] Ali Esmail Al-Snafi. The pharmacology of Bacopa monniera. A review, International Journal of Pharma Sciences and Research, Dec 2013; 4 (12):154-159
[54] M.H Veerendra Kumar, Gupta Y.K. Effect of different extracts of Centella asiatica on cognition and markers of oxidative stress in rats, Journal of Ethnopharmacology, Feb 2002; 79 (2):253-260
[55] Kanwal Abhinav, Mehla Jogender, Kuncha Madhususana, Vegi Ganga Modi Naidu, Gupta Yogendrakumar, Sistla Ramakrishna. Anti-amnesic activity of Vitex negundo in scopolamine induced amnesia in rats, Pharmacology & Pharmacy, 2010;1:1-8
[56] Agnivesha, Charaka, Dridhabala, chakrapanidutta, Charakasamhita of Agnivesh, Sutrasthana 4/8: edited by

Vd.Yadavaji Trikamaji Acharya,1st edition, Varanasi: Chaukhambha Orientalia,2009, p.30
[57] https://en.wikipedia.org/wiki/Free-radical_theory_of_aging, modified on 15 May 2015.
[58] Bhavamishra, Bhavaprakashasamhita, Purvakhanda 6/225, 227; edited by Sri Brahmshankar Mishra, 11th Edition, Varanasi: Chaukhambha Sanskrit Bhavan; 2010. p153-154
[59] Cinara V. da Silva, Fernanda M. Borges, Eudes S. Velozo. Phytochemistry of some Brazilian Plants with Aphrodisiac Activity, Phytochemicals - A Global Perspective of Their Role in Nutrition and Health, Dr Venketeshwer Rao (Ed.), ISBN: 978-953-51-0296-0, InTech, [Available from: http://www.intechopen.com/books/phytochemicals-a-global-perspective-of-their-role-in-nutrition-andhealth/phytochemistry-of-some-brazilian-plants-with-aphrodisiac-activity]
[60] Cleland J,Conde-Agudelo A, Peterson H, Ross J, Tsui A. Contraception and health, Lancet, 14Jul 2012;380 (9837): 14956
[61] Agnivesha, Charaka, Dridhabala, Chakrapanidutta, Carakasamhita, Sutrasthana, 4/8. In edited by Yadavaji Trikamji Acharya, 1st edition. Varanasi: Chaukhambha Surbharati Prakashana; 2009.p31
[62] Agnivesha, Charaka, Dridhabala, Sri Gangadhar Kaviratna Kaviraj, Charakasamhita of Agnivesh, Sutrasthana 4/8: edited by Shree Narendranath Sengupta,1st edition, Varanasi , Chaukhambha Orientalia,1991.p249
[63] Bhadanta Nagarjuna, Narasimha, Rasavaisheshika Sutra, 4/27; Edited by Sankar Menon, first edition, Trivedrum: The Superintendent,Government Press, 1928. p183
[64] P. V.Sharma, Dravyaguna Vijnyana, Vol 1, revised first edition, Varanasi: Chaukhambha Bharati Academy, 2006, p. 298
[65] Bhadanta Nagarjuna, Narasimha, Rasavaisheshika Sutra, 4/27; Edited by Sankar Menon, first edition, Trivedrum: The Superintendent,Government Press, 1928. p183
[66]http://www.herballegacy.com/Hartzog_Medicinal.html dt.18.03.15
[67] Sushrut, Dalhana, Sushrutasamhita, Sutrasthana 41/6; Edited Vd. Yadavaji Trikamji, Reprint, Varanasi: Chaukhambha Surabharati Prakashan; 2008, p182
[68] Pd sharangadharacharya, Adhamalla, Kashirama, Sarangadharasamhita, Purvakhand 4/1, Seventh edition: edited by Pd Parsurama Sastri, Vidyasagar, Varanasi, Chaukhambha Orientalia, 2008, p 35
[69] Agnivesha, Charaka, Dridhabala, chakrapanidutta, Charakasamhita of Agnivesh, Sutrasthana 22/13-14: edited by Vd.Yadavaji Trikamaji Acharya,1st edition, Varanasi , Chaukhambha Orientalia,2009.p 120
[70] Sushrut, Dalhana, Sushrutasamhita, Sutrasthana 41/6; Edited Vd. Yadavaji Trikamji, Reprint, Varanasi: Chaukhambha Surabharati Prakashan; 2008, p.182
[71] Agnivesha, Charaka, Dridhabala, chakrapanidutta, Charakasamhita of Agnivesh, Chikitsasthana 15/19: edited by Vd.Yadavaji Trikamaji Acharya,1st edition, Varanasi: Chaukhambha Orientalia,2009.p.515
[72] Agnivesh, Charaka, Dridhabala, Charakasamhita of Agnivesha, Vimanasthana 8/108-109: edited by Vd.Yadavaji Trikamaji Acharya,1st edition, Varanasi: Chaukhambha Orientalia,2009, p.278
[73] Sushrut, Dalhana, Sushrutasamhita, Sutrasthana.45/26; Edited Vd. Yadavaji Trikamji, Reprint, Varanasi: Chaukhambha Surabharati Prakashan; 2008, p.199

Table 1 showing list of drugs having *Rasayana* property with antioxidant activity

No.	Rasayana	Botanical source	Part Used	Research study
1.	*Amalaki*	*Emblica officinalis* Gaertn.	Seed	Free radical scavenging activity by DPPH and reducing power method [5]
			Methanolic extract of Fruit	Anti-oxidant activity by DPPH radical, hydroxyl radical, Superoxide anion radical, Reducing power, inhibition capability of Fe
2.	*Asana*	*Pterocarpus marsupium* Roxb	Heartwood	Radical scavenging by DPPH reduction, Nitric oxide [6]
3.	*Bakuchi*	*Psoralea corylifolia* Linn	-	-
4.	*Bhringaraja*	*Eclipta alba* (Linn.) Hassk.	Methanolic extract of leaves	Radical scavenging by DPPH [7]
5.	*Brahmi*	*Bacopa monnieri* (Linn.) Penn.	Ethanolic extract of aerial part	Free radical scavenging by Nitric oxide, Superoxide radical, and reducing power [8]
6.	*Gambhari*	*Gmelina arborea* Roxb.	Ethanolic, ethyl acetate, petroleum ether extract of Fruit	Reducing power assay, Radical scavenging by DPPH [9]
7.	*Guduchi*	*Tinospora cordifolia*	Five different extracts of leaves	Total reducing sugar, lipid peroxidation, DPPH & superoxide radical scavenging method [10]
8.	*Guggulu*	*Balsamodendron mukul* Hook. ex Stocks	Guggulu extract	Hydroxyl radical scavenging, lipid peroxidation inhibition activity [11]
9.	*Kshiravidari*	*Ipomoea digitata* Linn.	Methanolic extract of root	Nitric oxide, Total anti-oxidant activity [12]
10.	*Lashuna*	*Allium sativum* Linn	Ethanolic and aqueous extract of bulb	Radical scavenging by DPPH, Nitric oxide, Reducing power, Total phenolic content [13]
11.	*Mahashatavari*	*Asparagus adscendens* Roxb.	-	-
12.	*Mandookaparni*	*Centella asiatica* (Linn.) Urban	Ethanolic extract of leaves	Reducing potential, radical scavenging by DPPH [14]
13.	*Mushali*	*Asparagus adscendens* Roxb. *Chlorophytum arundinaceum* Baker	Methanolic extract of tuber	Ferrous ion chelating assay, Beta carotene bleaching assay, radical scavenging DPPH [15]
14.	*Pippali*	*Piper longum* Linn.	Extract of fruit	Total phenolic content, Radical scavenging by DPPH, ABTS [16]
15.	*Shalaparni*	*Desmodium gangeticum* DC	Total alcoholic extract	Superoxide dismutase, glutathione and catalase increases with lipid peroxide decrease [17]
16.	*Shankhapushpi*	*Convolvulus pluricaulis* Choisy.	Methanolic extract of whole plant	By DPPH method [18]
17.	*Shatavari*	*Asparagus racemosus* willd	Root extract	Free radical by DPPH method [19]
18.	*Talamuli*	*Curculigo orchioides* Gaertn	Methanolic extract of rhizome	Lipid peroxidation, activity of antioxidant enzyme SOD, CAT, GPX,GRD [20]
19.	*Varahi*	*Dioscorea bulbifera* Linn	Ethyl acetate extract of bulb	Scavenging activity by DPPH, ABTS, total phenolic content [21]
20.	*Vidari*	*Pueraria tuberosa* DC.	Tuber	ABTS assay, lipid peroxidation, superoxide, hydroxyl radical scavenging activity [22]

[SOD- Superoxide dismutase, CAT- catalase, GPX-Glutathione peroxidase, ABTS- 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid, DPPH- 2,2-diphenyl-1-picrylhydrazyl, GRD- Glutathione reductase]

Table 2 showing list of drugs having *Rasayana* vis a vis *Vrishya* property				
No.	**Vrishya**	**Botanical source**	**Part used**	**Research activity**
1.	*Ajaji*	*Cuminum cyminum* Linn.		--
2.	*Ajamoda*	*Trachyspermum roxburghianum* (DC.) Craib		--
3.	*Amalaki*	*Emblica officinalis* Gaertn	Fruit	Sexual behavior in Drosophila melanogaster [23]
4.	*Bhallataka*	*Semecarpus anacardium* Linn. f.	Ether, chloroform, ethanolic extract of Seed	Mounting behavior test, assessment of mating performance [24]
5.	*Bharadwaji*	*Gossypium herbaceum* Linn.	--	--
6.	*Draksha*	*Vitis vinifera* Linn.	--	--
7.	*Gambhari*	*Gmelina arborea* Roxb	--	--
8.	*Gokshura*	*Tribulus terrestris* Linn.	Aqueous extract of Fruit	Sexual behavior, Testosterone level, sperm count [25]
9.	*Ikshu*	*Saccharum officinarum* Linn.	Stem	Policosanol/ PPG derived from sugarcane enhance sexual function [26]
10.	*Krishnajeeraka*	*Carum carvi* Linn.	Seed	Anti-fertility, Anti-oxidant, Adaptogenic, Nootropic activity [27]
11.	*Kadali*	*Musa paradisiaca* Linn	Aqueous extract of root	Stimulate testicular function and exhibit both androgenic and anabolic function [28]
12.	*Kapikachhu*	*Mucuna prurita* Hook.	Seed powder	Sixty infertile subjects treated with 5g/day seed powder of Kapikachhu improves sperm count and motility [29]
13.	*Kshirini*	*Euphorbia thymifolia* Linn	-	-
14.	*Lashuna*	*Allium sativum* Linn	Aqueous extract of rhizome	Significant increase in the weight of seminal vesicles and epididymis of male animals as compared to controls and the sperm count was significantly elevated [30]
15.	*Mahashatavari*	*Asparagus adscendens* Roxb	Root powder	It is used as Safed musali. More popular in industry for increasing sperm count and sexual behavior.
16.	*Mushali*	*Chlorophytum arundinaceum* Baker	Ethanolic extract of root & sapogenin isolates	Sexual behavior and spermatogenesis [31]
17.	*Padmakesara, Mrinala*	*Nelumbo nucifera* Gaertn.	Flower	Male sexual profile and testosterone level [32]
			Seed	Anti-fertility activity [33]
18.	*Palasha*	*Butea monosperma*	Methanolic extract of	The effect of Methanolic extract of B.frondosa treatment on sexual behavior of both young (5 month)

Table 2 continued - showing list of drugs having *Rasayana* vis a vis *Vrishya* property				
No.	**Vrishya**	**Botanical source**	**Part used**	**Research activity**
1.	*Patalagaarudi*	Cocculus hirsutus (Linn.) Diels	Methanolic extract of whole plant	The significant increase in the weight of reproductive organs is also indirectly supports the increase availability of androgens. Increased weight and high protein concentration of the testis indicates the enhancement of testicular growth [35]
2.	*Patola*	Trichosanthes dioica Roxb.	Seed	The roots also contain an abortifacient protein, trichosanthin, which is a ribosome-inactivating protein (RIP), a similar RIP, trichokirin, was also found in the seeds of Trichosanthes [36].
3.	*Pippali*	Piper longum Linn.		-
4.	*Prishniparni*	Uraria picta Desv.		-
5.	*Shaali*	Oryza sativa Linn.		-
6.	*Shankhapushpi*	Convolvulus pluricaulis Choisy		-
7.	*Shara*	Saccharum munja Roxb		-
8.	*Shunthi*	Zingiber officinale Rosc	Aqueous extract of rhizome	Androgenic activity [37]
9.	*Talamuli*	Curculigo orchioides Gaertn	Ethanolic extract of Rhizome	Sexual behavior and spermatogenesis in rats [38]
10.	*Tugakshiri*	Bambusa bambos (L.) Voss	Ethanolic extract of tender shoot	The number of spermatozoa in the caput and cauda epididymis was decreased with concomitant decrease in the motility of spermatozoa collected from the cauda epididymis. Also the weight of testes, epididymis, vas deferens and prostate were significantly decreased [39].
11.	*Vridhhadaru*	Argyreia speciosa Sweet.	Root, flower, leaves	Study was carried out on sexual behavior in rats [40].

Table 3 showing list of drugs having *Rasayana* vis a vis *Hridya* property				
No.	**Hridya**	**Botanical Source**	**Part used**	**Experimental activity**
1.	*Ajamoda*	*Trachyspermum roxburghianum* (DC.) Craib.	-	-
2.	*Bakuchi*	*Psoralea corylifolia* Linn.	Aqueous extract of whole plant	Cardioprotective activity, Serum levels of CK-MB, LDH and SGPT enzymes [41]
3.	*Bijapura*	*Citrus medica* Linn.	Ethanolic and aqueous extract of peel	ACE inhibitor activity [42]
4.	*Brihati*	*Solanum indicum* Linn		--
5.	*Chakramarda*	*Cassia tora* Linn.	Extract of leaves	Cardioprotective activity [43]
6.	*Katuki*	*Picrorhiza kurroa* Royle ex Benth	Root extract	Cardioprotective activity [44]
7.	*Kharjura*	*Phoenix dactylifera* Linn.		-
8.	*Mahashatavari*	*Asparagus adscendens* Roxb		-
9.	*Patalapushpa*	*Stereospermum personatum* (Hassk.) D. Chatterjee.		-
10.	*Patola*	*Trichosanthes dioica* Roxb		-
11.	*Shaileya*	*Parmelia perlata* (Huds.) Ach.		--
12.	*Shyonaka*	*Oroxylum indicum* Vent.		--
13.	*Surasa*	*Ocimum sanctum* Linn.	Extract of whole plant	The long term feeding of OS offers significant protection against isoproterenol-induced myocardial necrosis in Wistar rats through enhancement of endogenous antioxidant [45]
14.	*Vasa*	*Adhatoda vasica* Nees.		--
15.	*Yuthika*	*Jasminum auriculatum* Vahl		--

Table 4 showing list of drugs having *Rasayana* vis a vis *Medhya* property

No.	**Medhya, Smritida**	**Botanical source**	**Part used**	**Experimental activity**
1.	*Ajaji*	*Cuminum cyminum* Linn.	Seed extract	The cognition was observed to be dose-dependent as determined by the acquisition, retention, and recovery in rats [46].
2.	*Gambhari*	*Gmelina arborea* Roxb.	Alcohol and aqueous Extract of fruit	Memory enhancing effect in electroshock induced amnesia in rats [47]
3.	*Haritaki*	*Terminalia chebula* Retz.	Ethanolic extract of fruit	Learning and memory capacity in albino rats [48]
4.	*Krishnajeeraka*	*Carum carvi* Linn.	Aqueous extract of seed	Nootropic activity [49]
5.	*Lashuna*	*Allium sativum* Linn.	-	-
6.	*Mahashatavari*	*Asparagus adscendens* Roxb.	-	-
7.	*Mahashravani*	*Sphaeranthus africanus* Linn	-	-
8.	*Mundi*	*Sphaeranthus indicus* Linn. (Also auct. non L.)	-	-
9.	*Shankhapushpi*	*Convolvulus pluricaulis* Choisy.	Ethanolic extract of whole plant	Learning and memory power in mice [50]
10.	*Shatavari*	*Asparagus racemosus* willd	Aqueous extract of root	Nootropic activity [51]
11.	*Aparajita*	*Clitoria ternatea* Linn.	Ethanolic extract of leaves	Neuroprotective and Nootropic activity [52]
12.	*Yava*	*Hordeum vulgare* Linn.	-	-
13.	*Brahmi*	*Bacopa monnieri* (Linn.) Penn	Methanolic extract of whole plant	Memory enhancing activity [53]
14.	*Mandookaparni*	*Centella asiatica* (Linn.) Urban	Aqueous, methanolic chloroform extracts of whole plant	Cognitive function [54]
15.	*Nirgundi*	*Vitex negundo* Linn	Extracts of whole plant	Anti-amnesic activity [55]