

## PHYTOCHEMICAL AND PHARMACOLOGICAL PROPERTIES OF T.RENAL-KFT, AN AYURVEDIC POLY HERBO-METALLIC FORMULATION

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## ABSTRACT

T. Renal KFT is a poly herbo-metallic composition in tablet form which includes a total of 24 herbs and properly processed metals which is used to treat symptoms of CKD including oedema, reduced urinary output, anemia and other associated symptoms. These herbs are selected in such a way which are been used in traditional sciences since long back. The aim of this study is to evaluate the possible mode of action of the composition based on the classical properties mentioned in the textbooks and also evaluating its pharmacological and biological activities. Classical textbooks, API, Various databases and search engines were used to screen and extract the related data. All the herbs and metals used in the formulation possess numerous active constituents which are responsible for exhibiting multiple actions such as Anti-inflammatory, Diuretic, Anti-lithiatic, Anti-anaemic, Hepato-protective, Immunomodulatory activities etc. Hence, this can be used as a potent alternative for the various associated symptoms of CKD.

**Key words:** Chronic Kidney Disease or CKD, T. Renal-KFT, Herbo-metallic Tablet

## INTRODUCTION

CKD or chronic kidney disease can be defined when Glomerular Filtration Rate (GFR) of less than 60 mL/min/1.73 m<sup>2</sup>, albuminuria of at least 30 mg per 24

hours, or markers of kidney damage (e.g., haematuria or structural abnormalities such as polycystic or dysplastic kidneys) persists for more than 3 months.

While defining on a broader aspect, when there is detection of an abnormality in the kidney function or structure which is persisting for more than 3 months, then it is termed as CKD. The abnormality may include one or more than the following: (1) GFR less than 60 mL/min/1.73 m<sup>2</sup>; (2) albuminuria (i.e., urine albumin  $\geq$ 30 mg per 24 hours or urine albumin-to-creatinine ratio [ACR]  $\geq$ 30 mg/g); (3) abnormalities in urine sediment, histology, or imaging suggestive of kidney damage; (4) renal tubular disorders; or (5) history of kidney transplantation<sup>1</sup>. CKD has become widespread and has surfaced as one of the leading non-communicable reasons of death worldwide. It is estimated to affect multitude of population over the time and will further rise in importance among the various global causes of death. Population of different regions of the world is affected by the CKD unequally, likely as a result of differences in population demographic characteristics, their comorbidities, and access to health care resources. Negative and devastating effects of CKD should prompt major efforts to develop and implement effective preventative and therapeutic efforts aimed at lowering the development of CKD and slowing its progression<sup>2</sup>.

There are five stages of CKD. Only small proportion of CKD subjects progress to End Stage Renal Disease. As per Harrison's textbook of Internal Medicine, CRF corresponds to stage 3-5 stages of CKD in which GFR is < 60 ml/min/1.73-meter square<sup>3</sup>. Mostly people affected with the disease in their later stages has to opt either for Dialysis or Kidney transplantation. But both these options are also available to a handful section of society and are financially very draining, leaving the patient and their family in huge financial crisis. This creates a huge unmet demand of more easily available and financially feasible options in the society for the patients suffering from CKD to reduce the burden of the disease.

Ayurveda, on the other hand has a vast potential in terms of reach, availability, efficacy and economical aspect. Numerous herbs, metals and minerals in the *Bhasma* form possess excellent nephro-protective activities. In Ayurveda, no direct description of CKD

has been mentioned, but based on its symptoms such as Oliguria, decreased Glomerular Filtration Rate (GFR), hyperuricemia etc., it can be treated on the lines of treatment of *Mutravaha Srotasa Vikara*. T. RENAL-KFT is an Ayurvedic proprietary formulation which is composed having a combination of herbs and metals, which produces maximum beneficial effects in the patients suffering from CKD and prevents further deterioration of the condition of patient and improves their quality of life. T. RENAL-KFT consists of a combination of 24 ingredients including *Vayvidanga, Pushkarmoola, Devadaru, Daruhaldi, Haldi, Danti, Harad, Bahera, Amla, Gokshura, Chitrak, Chavya, Indrajau, Kutki, Piplamool, Rakt punarnava, Nishoth, Sonth, Kali Mirch, Pippali, Motha, Kiratikt, Mandoor bhasma* and *Gomutra*.

In this paper, a combined approach of traditional as well as modern aspects is correlated and presented to understand the possible pharmacodynamics of the composition. It has broadly explained the active constituents and associated pharmacological activities exhibited by the combination of these herbs and has tried to elucidate the possible rationale of selecting these herbs.

### Material & Method

The Textbook of 'Reviews on Indian Medicinal Plants' by ICMR, Bhavaprakasha Nighantu by Acharya Bhavamishra, The Ayurvedic Pharmacopoeia of India by Government of India, Ministry of AYUSH, Classical textbook of Pathology by 'Harsh Mohan', Published research articles in different journals available online, Various databases and Search engines.

### Result

Data obtained after screening classical as well as various research works conducted shows the plethora of therapeutic activities. The presence of multiple active chemical constituents results in exhibiting a range of biological functions. The different active constituents present in the ingredients of T.Renal-KFT are mentioned in Table 1.

**Table 1: Chemical constituents of the ingredients of T.RENAL-KFT**

S.no.	Ingredient	Botanical name	Part used	Chemical Constituent
1.	Vayvidanga	<i>Embelia ribes</i>	Fruit	Embelin (2,5-dihydroxy-3-undecyl-1, 4-benzoquinone), Embelinol, Embeliaribyl ester, Embeliol, Protein, Crude fibre, Oxides of Calcium and Phosphorus <sup>4,5</sup> .
2.	Pushkarmool	<i>Inula racemosa</i>	Root	Alantolactone (ALT), Isoalantolactone (IALT) <sup>6</sup> , Dihydroalantolactone, Dihydroisoalantolactone, Inunolide, Dihydroinunolide, Neoalantolactone, Isoalantolactone, Alloalantolactone, Inunal, Isoinunal, Alantodiene, Isoalantodiene, Daucosterol, D- mannitol and Beta sitosterol <sup>7</sup> .
3.	Devdaru	<i>Cedrus deodara</i>	Wood	Himadarol <sup>8</sup> , Centdarol, Allohimachalol, Cedeodarin (6-methyltaxifolin), Dihydromyricetin, Cedrin (6-methyldihydromyricetin), Cedrinol <sup>9</sup> , Dihydrodehydrodiconiferyl alcohol and its 4'-glucoside, Cedrusin and its 4'-glucoside, Himasecolone, Meso-secoisolariciresinol and Cedrusinin <sup>10</sup> .
4.	Daruhaldi	<i>Berberis aristata</i>	Wood	Berberine, Berberine chloride, Palamatine chloride, mixture of palmatine and berberine chlorides <sup>11</sup> .
5.	Haldi	<i>Curcuma longa</i>	Rhizome	Curcumin I, II and III <sup>12</sup> , Dihydrocurcumin, Protein, Fat, Fibre, Carbohydrates, Minerals, Phosphorus, Iron, Calcium, Carotene, Thiamine, Niacin, Folic acid and other trace elements <sup>13</sup> , Eugenol, Ar-curcumene.
6.	Danti	<i>Baliospermum montanum</i>	Fruit	Glycosides, Terpenoids, Flavonoids, Saponins, Sterols, 11, 13-dihydroxytetracos-trans-9-enoic acid (axillaric acid) <sup>14</sup> .
7.	Harad	<i>Terminalia chebula</i>	Fruit	Phenols, Flavonoids, Gallic acid, Catechin, Chlorogenic acid, Coumaric acid <sup>15</sup> , Ascorbic acid, Gallic acid, Ellagic acid, Chebulic acid, Chebulinic acid, Punicalagin, Tannic acid, D-glucose, D-fructose, Quinic acid, Shikimic acid <sup>16</sup> .
8.	Baheda	<i>Terminalia bellirica</i>	Fruit	Tain termilignan, thannilignan, 7-hydroxy-3',4'-(methylenedioxy) flavones, anolignan B 5, gallic acid, ellagic acid, $\beta$ -sitosterol, Termilignan, Thannilignan, Flavonoids, Sterols, Tannins, Chebulagic acid <sup>17</sup> .
9.	Amla	<i>Emblica officinalis</i>	Fruit	Ascorbic acid, Tannins, Vitamin C <sup>18</sup> , Polyphenols, Amino acids/Sugars, Trace elements <sup>18</sup> .
10.	Gokshura	<i>Tribulus terrestris</i>	Fruit	Tigogenin, Neotigogenin, Gitogenin, Neogitogenin, Hecogenin, Neohecogenin, Diosgenin, Chlorogenin, Ruscogenin, Sarsasapogenin, Kaempferol, Kaempferol-3-glucoside, Kaempferol-3-rutinoside, Tribuloside [kaempferol-3- $\beta$ -d-(6''-p-coumaroyl) glucoside, $\beta$ -sitosterols and Stigmasterols <sup>20</sup> .
11.	Chitrak	<i>Plumbago zeylanica</i>	Root, Bark	Phenol, Acetaldehyde tetramer, 2-[2-(2-ethoxyethoxy) ethoxy] ethanol, Benzoic acid, 2,2'-[oxybis(2,1-ethanedioxy)] bis ethanol, 2-methoxy-14-benzenediol, Semioxamazide, n-hexadecanoic acid, Ethyl ester of 4-ethoxybenzoic acid, 2-methoxy-1, 1'-oxybisethane, Iodoethane, N-3-diethyl-3-hepatanamine, Plumbagin and Sucrose <sup>21</sup> .
12.	Chavya	<i>Piper retrofractum</i>	Stem	Piperine, Guineensine, Piperlongumine <sup>22</sup> , Hookerionone A, (2R, 3R, 5S)-2-Piperonyl-3, 5-dihydro-5-

				methoxy-3-methyl-5-(2-propenyl)-6(2H)-benzofuranone <sup>23</sup> .
13.	Indrajau	<i>Holarrhena anti-dysenetrica</i>	Seed	Antidysentericine <sup>24</sup> , Conessine, Conimine, Holarrhimine, Isoconessimine, Holarrhenosterol and $\beta$ -Sitosterol <sup>25</sup> .
14.	Kutki	<i>Picrorhiza kurroa</i>	Root	Aucubin, Catalpol <sup>26</sup> , Cucurbitacin B, Cucurbitacin D, Cucurbitacin E, Kurrin, Kurroside, Kutki-sterol, Seroside B <sup>27</sup> .
15.	Pippalimool	<i>Piper longum</i>	Root	Piperine, Piperttine, Piperdadine, Longamide <sup>28</sup> .
16.	Punarnava	<i>Boerhaavia diffusa</i>	Root	Sterols, $\beta$ -sitosterol, Alkaloids, Flavonoids, Saponins, Terpenoids, Vitamin C, Ursolic acid, Hentriacontane <sup>29</sup> .
17.	Nishotha	<i>Operculina turpethum</i>	Root bark	Stigma-5,22-dien-3-O- $\beta$ -D-glucopyranoside, Scopoletin, Alkaloids, Saponins, Triterpenes, Tannins, Carbohydrates <sup>30</sup> .
18.	Sonth	<i>Zingiber officinale</i>	Rhizome	Zingiberenol, Zingiberene, 3-Gingerol, 4-Gingerol, Zingerone, 4-Shogaol, 4-Gingerdiol <sup>31</sup> .
19.	Kali Mirch	<i>Piper nigrum</i>	Fruit	Piperine, Piperttine, Piperdadine, Longamide <sup>32</sup> .
20.	Pippali	<i>Piper longum</i>	Fruit	Piperine, Piperttine, Piperdadine, Longamide <sup>33</sup> .
21.	Motha	<i>Cyperus rotundus</i>	Root	Sugars, Starch, Sterols and Flavonoids <sup>34</sup> .
22.	Kiratikt	<i>Swertia chirata</i>	Whole plant	Gentianine, Gentiocrucine, Sweroside, Sweroside 2'-O-3'',3''', 5''-trihydroxybiphenyl-2''- carboxylic acid ester, Amarogentin <sup>35</sup> .
23.	Mandoor Bhasma	---	---	Ferrous oxide of Iron (Fe <sub>2</sub> O <sub>3</sub> ), Silicon dioxide (SiO <sub>2</sub> ) <sup>36</sup> .
24.	Go mutra	---	---	Vitamin A, B, C, D & E, minerals, lactose, enzymes <sup>37</sup> .

Owing to these multiple active constituents found in a drug, it exhibits numerous pharmacological and biological activities and produces desired therapeutic results. Classical textbooks of Ayurveda have also mentioned various properties and actions of these individual herbs used in this composition. After undergoing related published research works and textbooks, a collective assay of the activities exhibited by the herbs and metals used in this composition has been done, described in Table 2.

**Table 2: Pharmacological and Biological Properties of the Ingredients of T.RENAL-KFT**

S.no.	Ingredient	Botanical name	Karma	Pharmacological and Biological activity
1.	Vayvidanga	<i>Embelia ribes</i>	Raktshodhak, Krimighn, Rasayan, Balya, Deepanapachana <sup>38</sup> .	Anti-inflammatory, Hepato-protective, Anti-bacterial activity <sup>39</sup> .
2.	Pushkarmool	<i>Inula racemosa</i>	Shothhar, Aruchinashak, Adhymanhar, Udarshoolhar <sup>40</sup> .	Anti-inflammatory, Analgesic, Hepato-protective, Anti-oxidant <sup>41</sup> .
3.	Devdaru	<i>Cedrus deodara</i>	Shothahar, Adhymanhar, Mutrajanan <sup>42</sup> .	Anti-inflammatory, immunomodulatory, Antioxidant activity <sup>43</sup> .
4.	Daruhaldi	<i>Berberis aristata</i>	Deepan-pachana, Yakritpleeha vridhi har, Rasayan <sup>44</sup> .	Hepato-protective, Nephro-protective activity <sup>45</sup> .
5.	Haldi	<i>Curcuma longa</i>	Shothahar, Raktavikarhar, Panduhar, Kamlahar, Yakritvikarhar <sup>46</sup> .	Hepato-protective, Anti-inflammatory, Nephro-protective activity <sup>47</sup> .
6.	Danti	<i>Baliospermum montanum</i>	Udarrogahar, Shothahar, Arshahar, Shoolhar, Raktvikar nashak <sup>48</sup> .	Hepato-protective activity <sup>49</sup> .
7.	Harad	<i>Terminalia chebulala</i>	Shothahar, Krimihar, Vibandhar, Yakrit-	Anti-inflammatory, Hepato-protective, Nephro-protective activity <sup>51</sup> .

			pleeharogahar, Mutrakricchahar <sup>50</sup> .	
8.	Baheda	<i>Terminalia bellirica</i>	Kriminashak, Udar rogahar, Pleehavidhihar, Arshahar <sup>52</sup> .	Nephro-protective, Anti-urolithiatic activity <sup>53</sup> .
9.	Amla	<i>Emblica officinalis</i>	Mutrakricchahar, Panduhar, Kamalahar, Jirna vibandhahar <sup>54</sup> .	Antioxidant, Hepato-protective, Anti-inflammatory, Antilithiatic activity <sup>55</sup> .
10.	Gokshura	<i>Tribulus terrestris</i>	Balkarak, Arshahar, Mutrakricchahar, Ashmarihar, Vrikkvikarhar <sup>56</sup> .	Diuretic, Antiurolithiatic, Immunomodulatory, Hepato-protective, Anti-inflammatory, Analgesic, Antispasmodic activity <sup>57</sup> .
11.	Chitrak	<i>Plumbago zeylanica</i>	Shothahar, Arshnashak, Apachanhar, Adhymanhar, Gulmnashak, Rasayan <sup>57</sup> .	Hepato-protective, Analgesic, Antioxidant, Anti-inflammatory activity <sup>58</sup> .
12.	Chavya	<i>Piper retrofractum</i>	Vrikkrogahar, Pachak, Adhymanhar <sup>59</sup> .	Anti-inflammatory, Hepato-protective, Appetizer activity <sup>60</sup> .
13.	Indrajau	<i>Holarrhena antidysenterica</i>	Raktarshahar, Raktadoshahar, Agnideepak, Shoolhar <sup>61</sup> .	Immunomodulatory, Hepato-protective activity <sup>62</sup> .
14.	Kutki	<i>Picrorhiza kurroa</i>	Raktadoshahar, Krimighn, Kamlahar, Panduhar, Yakritvikarhar, Kupachan har, Krimirohahar <sup>63</sup> .	Anti-inflammatory, Nephro-protective, Antianaemic activity <sup>64</sup> .
15.	Pippalimool	<i>Piper longum</i>	Pandurogahar, Krimirogahar, Ajirnahar, Aruchinashak <sup>65</sup> .	Hepato-protective, Analgesic, Anti-inflammatory activity <sup>66</sup> .
16.	Punarnava	<i>Boerhaavia diffusa</i>	Raktavikarhar, Pandurogahar, Atyant agnideepak, Shothagn, Udarrogahar <sup>67</sup> .	Hepato-protective, Diuretic, Anti-inflammatory activity <sup>68</sup> .
17.	Nishotha	<i>Operculina turpethum</i>	Shothahar, Udarrogahar, Virechak, Arshahar, Kamlahar <sup>69</sup> .	Anti-inflammatory, Hepato-protective, Nephroprotective activity <sup>70</sup> .
18.	Sonth	<i>Zingiber officinale</i>	Vibandhhar, Shoolhar, Shothahar, Arshanashak, Anahahar, Udarrogahar <sup>71</sup> .	Antioxidant, Anti-inflammatory activity <sup>72</sup> .
19.	Kali Mirch	<i>Piper nigrum</i>	Shoolhar, Krimirogahar, Agnideepak, Adhymanhar, Apachanhar <sup>73</sup> .	Analgesic, Anti-inflammatory, Hepato-protective activity <sup>74</sup> .
20.	Pippali	<i>Piper longum</i>	Pandurogahar, Krimirogahar, Ajirnahar, Aruchinashak <sup>75</sup> .	Analgesic, Anti-inflammatory, Hepato-protective activity <sup>76</sup> .
21.	Motha	<i>Cyperus rotundus</i>	Aruchihar, Krimirogahar, Deepaka, Pachak, Mutrajanak <sup>77</sup> .	Anti-inflammatory, Hepato-protective, Diuretic activity <sup>78</sup> .
22.	Kiratikt	<i>Swertia chirata</i>	Raktadoshahar, Shothahar, Krimirogahar, Adhymanhar, Kamalarogahar, Panduhar <sup>79</sup> .	Hepato-protective, Anti-inflammatory, Antioxidant activity <sup>80</sup> .
23.	Mandoor Bhasma	---	Pandurogahar, Kamalahar, Shothahar, Pleeharogahar <sup>81</sup> .	---
24.	Go mutra	---	Shothahar, Kamalahar, Pandurogahar <sup>82</sup> .	---

## DISCUSSION

The present study was planned to discuss the possible mode of action of a poly herbo-metallic composition T.Renal-KFT. After screening the data, it showed that all the drugs of T.Renal-KFT exhibits the action ma-

ajorly on relieving symptoms as *Shotha* (oedema), *Adhymana*, *Anaha*, *Vibandha*, *Ajirna* (Disorders of GIT), *Mutral* (maintains normal urine output), *Krimi* (worm infestation), *Shool* (pain), *Arsha* (Hemorrhoids), *Pandu* (anemia), *Raktavikara* (diseases due to Rakta dosha) etc. The drugs show diverse biologi-

cal activity, thereby producing desired and effective therapeutic action. All the *Karma* and Pharmacological activities as shown in Table 1 and Table 2 explains the possible rationale behind the composition of this formulation.

## CONCLUSION

T.Renal-KFT is an effective composition which can be used as a potent medicine for relieving the symptoms as *Shotha* (Oedema), *Pandu* (Anemia), *Muturakriccha* (Dysuria), *Mutraghata* (reduced urinary output) which are commonly observed in patients of CKD. It can also be effectively used in conditions like *Arsha* (Hemorrhoids), *Adhymana*, *Anaha*, *Vibandha*, *Ajirna* (Disorders of GIT), *Krimi* (worm infestation).

## REFERENCES

1. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl.* 2013;3(1):1–150.
2. Kovesdy CP. Epidemiology of chronic kidney disease: an update 2022. *Kidney Int Suppl* (2011). 2022 Apr;12(1):7-11. doi: 10.1016/j.kisu.2021.11.003. Epub 2022 Mar 18. PMID: 35529086; PMCID: PMC9073222.
3. Joanne M. Bargman and Karl Skorecki: Chronic kidney disease. Harrison's Principles of Internal Medicine-17th edition (2008) Vol-2 Chapter no.280: 2308-2321.
4. Kaul, R., Ray, A. C. and Dutt, S. 1929. Constitution of the active principal of *Embelia ribes*. I. **J Indian Chem Soc** 6, 577-586.
5. Haq, K., Ali, M. and Siddiqui, A. W. 2005. New compounds from the seeds of *Embelia ribes* Burm. **Pharmazie** 60, 69-71.
6. Kalsi, P.; Goyal, R.; Talwar, K.; Chhabra, B., Epoxy alantolides: isoinal— a new potent plant growth regulator from *Inula racemosa*. *Phytochemistry* 1988,27 (7), 2079-2081.
7. Matthews, V.; Åström, M.-B.; Chan, M.; Bruce, C.; Krabbe, K.; Prelovsek, O.; Åkerström, T.; Yfanti, C.; Broholm, C.; Mortensen, O., Brain-derived neurotrophic factor is produced by skeletal muscle cells in response to contraction and enhances fat oxidation via activation of AMP-activated protein kinase. *Diabetologia* 2009,52 (7), 1409-1418.
8. Puri, V. N., Kar, K., Patnaik, G. K., Dhawan, B. N., Kulshreshtha, D. K. and Rastogi, R.P. 1975. Spasmodic constituents of *Cedrus deodara* (Roxb.) Loud: Part II- Isolation and evaluation of allohimachalol and three new sesquiterpene alcohols. *Indian J Exp Biol* 13, 369-370.
9. Agrawal, P. K., Agarwal, S.K., Rastogi, R.P. and Osterdahal, B. G. 1981. Dihydroflavanols from *Cedrus deodara*, a <sup>13</sup>CNMR study. *Planta Med* 43, 82-85.
10. Agrawal, P. K. and Rastogi, R. P. 1982. Two lignans from *Cedrus deodara*. *Phytochemistry* 21, 1459-1461.
11. Chakravarti, K. K. 1950. Alkaloidal constituents of the bark of *Berberis aristata* (Rassaut). **J Sci Ind Res** 9B, 306.
12. Venkateshwarlu, V, 1997. Cyclo-oxygenase inhibitors from spices. **Indian Drugs** 34, 427-432.
13. Gopalan. C., Rama Sastri, B. V. and Balasubramanian, S. C. 1971. Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad, Indian Council of Medical Research, New Delhi. Revised by Narasinga Rao, B. S., Deosthale, Y. G. and Pant, K. C. 1989. P. 50, 53, 61, 63, 71, 90.
14. Husain, s., Ahmad, M.U. and Osman, S.M. 1980. New hydroxyl fatty acid from seed oil of *Baliospermum axillare*. *Phytochemistry* 19, 75-77.
15. I.D. Bhatt, S. Rawat, A. Badhani, R.S. Rawal, Nutraceu-tical potential of selected wild edible fruits of the Indian Himalayan region, *Food Chem.* 215 (2017) 84–91.
16. C. Notalapati, U. Chiranjeevi, P. Kishan, K. Kiran, U. Pingali, A randomized, double-blind, placebo-controlled, parallel group clinical study to evaluate the analgesic effect of aqueous extract of *terminalia chebula*, a proprietary chromium complex, and their combination in subjects with joint discomfort, *Asian J. Pharmaceut. Clin. Res.* 9 (3) (2016) 264–269.
17. Pfundstein B, El Desouky S K, Hull W E, Haubner R, Erben G, et al., Polyphenolic compounds in the fruits of egyptian medicinal plants (*Terminalia bellirica*, *Terminalia chebula* and *Terminalia horrida*): Characterization, quantitation and determination of antioxidant capacities, *Phytochem*, 2010, 71, 1132–1148.
18. Raja Rao, G. R. 1958. Retention of Vitamins in some Indian preserved fruits. **Andhra Agric J** 5, 183-186.
19. Gopalan, C., Rama Sastri, B. V. and Balasubramanian, S. C. 1971. Nutritive value of Indian foods. National Institute of Nutrition, Hyderabad. Indian Council of Medical Research, New Delhi. Revised by Narasinga Rao, B. S., Deosthale, Y. G. and Pant, K. C. 1989. P. 53, 63, 71, 90.
20. Abirami P, Rajendran A. GC-MS Analysis of *Tribulus terrestris*. *L Asian J Plant Sci Res.* 2011; 1:13–1.
21. Salunke, G. R., ghosh, S., Santosh Kumar, R. J., Khade, S., Vashisth, P., Kale, T., Chopade, S., Pruthi, V., Kundu,

- G., Bellare, J. R. and Chopade, B. A. 2014. Rapid efficient synthesis and characterization of silver, gold and bimetallic nanoparticles from the medicinal plant *Plumbago zeylaica* and their application in biofilm control. **Int J Nanomed** **9**, 2635-2653.
22. Mishra, S. S. and Tewari, J. P. 1964. Phytochemical investigation of *Piper chaba*. **J Pharmaceut Sci** **53**, 1423-1424
23. Bodiwala, H. S., Singh, G., Singh, R., Dey, C. S., Sharma, S. S., Bhutani, K. K. and Singh, I. P. 2007. Antileishmanial amides and lignans from *Piper cubeba* and *Piper retrofractum*. **J Nat Med** **61**(4), 418-421.
24. Kumar, A. and Ali, M. 2000. A new steroidal alkaloid from the seeds of *Holarrhena antidysenterica*. **Fitoterapia** **71**, 101-104.
25. Siddiqui, S. 1934. The alkaloids of *Holarrhena antidysenterica*. Part II. Two further new alkaloids from the bark and the seeds of Indian *Holarrhena* and their constitutional relationship to conessine. **J Indian Chem Soc** **11**, 283-291.
26. Kumar, V., Sood, H., Sharma, M. and Chauhan, R. S. 2013. A proposed biosynthetic pathway of picrosides linked through the detection of biochemical intermediates in the endangered medicinal herb *Picrorhiza kurroa*. **Phytochem Anal** **24**, 598-602.
27. Mallick, M. N., Singh, M., Praveen, R., Khan, W., Ahmad, S., Najm, M. Z. and Hussain, S. A. 2015. HPTLC analysis of bioactivity guided anticancer enriched fraction of hydroalcoholic extract of *Picrorhiza kurroa*. **Bio Med Res Int**, Article ID 513875.
28. Govindachari, T. R., Jadhav, S. J., Joshi, B.S., Kamat, V.N., Mohamed, P.A., Parthasarathy, P.C., Patankar, S.J., Prakash, D., Rane, D.F. and Viswanathan, N. 1969. Chemical investigation of some Indian Plants: PartIV. **Indian J Chem** **7**, 308-310.
29. Misra, A.N. and Tiwari, H.P. 1971. Constituents of roots of *Boerhaavia diffusa*. **Phytochemistry** **10**, 3318-3319.
30. Mishra, A., Mishra, A. K., Ghosh, A. K. and Jha, S. 2011. Pharmacognostical, physicochemical and phytochemical studies of some marketed samples of roots used in Ayurvedic medicines. **Pharmacog J** **3**(24), 55-61.
31. Reviews on Indian Medicinal Plants by Indian Council of Medical Research, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004,
32. Govindachari, T. R., Jadhav, S. J., Joshi, B.S., Kamat, V.N., Mohamed, P.A., Parthasarathy, P.C., Patankar, S.J., Prakash, D., Rane, D.F. and Viswanathan, N. 1969. Chemical investigation of some Indian Plants: PartIV. **Indian J Chem** **7**, 308-310.
33. Govindachari, T. R., Jadhav, S. J., Joshi, B.S., Kamat, V.N., Mohamed, P.A., Parthasarathy, P.C., Patankar, S.J., Prakash, D., Rane, D.F. and Viswanathan, N. 1969. Chemical investigation of some Indian Plants: PartIV. **Indian J Chem** **7**, 308-310.
34. Krishnaveni, A., Maheswari, R U., Mullaicharam, A. R., Venkatesh, J. J. and Lakshmi, G. P. 2004. Phytochemical and antimicrobial studies of *Cyperus rotundus*. **Antiseptic** **101**, 198-199.
35. Karan, M., Vasisht, K. and Handa, S. S. 1997. Morphological and chromatographic comparison of certain Indian species of *Swertia*. **J Med Aromat Plant Sci** **19**, 955-963.
36. Mulik SB, Jha CB. Physicochemical characterization of an Iron based Indian traditional medicine: *Mandura Bhasma*. **Anc Sci Life**. 2011 Oct;31(2):52-7. PMID: 23284206; PMCID: PMC3530268.
37. IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) eISSN: 2278-3008, p-ISSN: 2319- 7676. Volume 7, Issue 1 (Jul. – Aug. 2013), PP01-08.
38. Prof K.C. Chuneekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 112, Page no. 50.
39. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 10 (Ec-Ex), P.269.
40. Prof K.C. Chuneekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 175, Page no. 91.
41. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 13 (Ib-Ky), P.140.
42. Prof K.C. Chuneekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Karpuradi Varga, Shlok no. 25, Page no. 187.
43. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 5 (Ca-Ce), P.892.
44. Prof K.C. Chuneekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 202, Page no. 115.
45. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of

- Medical Research, New Delhi, 2004, Volume 4 (Ba-By), P.163.
46. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 197, Page no. 111.
47. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 8 (Cr-Cy), P.339.
48. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Guduchyadi Varga, Shlok no. 200, Page no. 385.
49. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 4 (Ba-By), P.42.
50. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 12, Page no. 5.
51. Hassan Bulbul MR, Uddin Chowdhury MN, Naima TA, Sami SA, Imtiaj MS, Huda N, Uddin MG. A comprehensive review on the diverse pharmacological perspectives of *Terminalia chebula* Retz. Heliyon. 2022 Aug 14;8(8):e10220. doi: 10.1016/j.heliyon. 2022.e10220. PMID: 36051270; PMCID: PMC9424961.
52. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 37, Page no. 9.
53. Kumar, N. & Khurana, S.M.P. (2018). Phytochemistry and medicinal potential of the terminalia bellirica roxb. (bahera). Indian Journal of Natural Products and Resources. 9. 97-107.
54. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 41, Page no. 10.
55. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 10 (Ec-Ex), P.334.
56. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Guduchyadi Varga, Shlok no. 46, Page no. 279.
57. Chhatre S, Nesari T, Somani G, Kanchan D, Sathaye S. Phytopharmacological overview of Tribulus terrestris. Pharmacogn Rev. 2014 Jan;8(15):45-51. doi: 10.4103/0973-7847.125530. PMID: 24600195; PMCID: PMC3931200.
58. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 71, Page no. 21.
59. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 67, Page no. 19.
60. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 20 (Pho-Pip), P.870.
61. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 159, Page no. 73.
62. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 12 (Ha-Hy), P.636.
63. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 152, Page no. 67.
64. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 20 (Pho-Pip), P.444.
65. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 57, Page no. 15.
66. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 20 (Pho-Pip), P.852.
67. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Guduchyadi Varga, Shlok no. 231, Page no. 406.
68. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 4 (Ba-By), P.298.
69. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Guduchyadi Varga, Shlok no. 194, Page no. 384.



70. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 18 (Oc-Ox), P.483.
71. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 46, Page no. 13.
72. Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, Li HB. Bioactive Compounds and Bioactivities of Ginger (*Zingiber officinale* Roscoe). Foods. 2019 May 30; 8(6):185. doi: 10.3390/foods8060185. PMID: 31151279; PMCID: PMC6616534.
73. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 61, Page no. 17.
74. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 20 (Pho-Pip), P.863.
75. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 57, Page no. 15.
76. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 20 (Pho-Pip), P.852.
77. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Karpuradi Varga, Shlok no. 94, Page no. 232.
78. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 8 (Cr-Cy), P.662.
79. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Haritkyadi Varga, Shlok no. 155, Page no. 70.
80. Reviews on Indian Medicinal Plants, Edited by A.K. Gupta, Neeraj Tandon, Published by Indian Council of Medical Research, New Delhi, 2004, Volume 27 (St-Sy), P.348.
81. Sadanand sharma, Ayurvedic Pharmaceuticals & Indian Academy, Rasa Tarangini, by dr. Ravindra angadi, Chapter 20; Sloka 32-40, Page No. 338-339.
82. Prof K.C. Chunekar, Bhavprakash Nighantu of Sri Bhavamishra, Edited by Dr. Gangasahay Pandey, Chaukhambha Bharati Academy, Varanasi, Reprint:2022, Mu-tra Varga, Shlok no. 5, Page no. 761

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