**PHARMACEUTICAL STANDARDIZATION OF SHATPALA GANDHAKA CHURNA**

**\*1Dr. T. Hema, 2Dr. Ch. Sridurga M.D. ( Ayu ), Ph.d.**

\*1 PG Scholar Final year, Department of *Rasa* *Shastra* and *Bhaishajya* *Kalpana*, S.V. Ayurvedic College, TTD, Tirupati. Andhra Pradesh, India.

\*2 Professor and HOD, Department of *Rasa Shastra* and *Bhaishajya Kalpana*, S.V. Ayurvedic College, TTD, Tirupati. Andhra Pradesh, India.

Address For Correspondence

Dr. T. Hema,

Final year PG scholar,

Department of *Rasa* *Shastra* and *Bhaishajya* *kalpana*,

S. V. Ayurvedic College, Tirupati-517501,

Andhra Pradesh, India.

e-mail: [thumbahema@gmail.com](mailto:thumbahema@gmail.com).

Phone number- 8309219527.

**ABSTRACT:**

*Rasa* *oushadis* are the potent *Ayurvedic* preparations mainly containing metals and minerals. These *Oushadis* possess wide range of therapeutic efficacy and are considered superior because of their qualities like small dose, quick action, palatability and longer shelf life. *Shatpala Gandhaka churna* is an important *Rasa oushadi* describedin *Vaidya chintamani- Kushtha prakaranam* indicated for all types of *Kushtha, Grahani, Gulma, Mandagni. Shatpala Gandhaka Churna* contains *Shuddha Gandhaka, Shuddha Bhallataka, Shuddha Chitrakamula twak, Triphala, Vidanga, Trikatu, Trijataka, Chanaka,* and *Jeeraka.* The main pharmaceutical procedures adopted in this study are *Shodhana*, *Churna* *nirmana* and preparation of capsule of *Shatpala Gandhaka Churna.* The specific pharmaceutical blend of these contents can result in a more effective formulation.Till now, no research work has been carried out to standardize this formulation. Therefore the present study has been planned to standardize the method of preparation of *Shatpala Gandhaka churna* according to the method explained in the classical literature.

**Keywords**: *Shatpala Gandhaka churna, Shodhana,* Standardization*.*

**INTRODUCTION**:

The nature possesses immensely valuable and powerful medicines in the form of metals, minerals and plants. However, most of the drugs as such are not absorbable into the biological system, until and unless they undergo certain modifications. Some specialized techniques are adopted to make these drugs absorbable and therapeutically viable. The drug manufacturing processes of *Ayurveda* are included in discipline of *Rasa Shastra* and *Bhaishajya Kalpana*. Mineral materials as such are claimed to be toxic by *Ayurvedic Rasa* texts. By adopting specialized pharmaceutical procedures like *Shodhana, Marana, Jarana, Murcchana* etc. they are converted into nontoxic, safe and potent therapeutic forms.

*Shatpala Gandhaka Churna* is one of the Herbo-mineral formulation mentioned in *Vaidya Chintamani,*[1]whichcontains6partsof *Shuddha Gandhaka and* 1part each of *Shuddha Bhallataka, Shuddha Chitrakamula twak, Triphala, Vidanga, Trikatu, Trijataka, Chanaka,* and *Jeeraka. Shodhana*, *Churna* *nirmana* and preparation of capsule of *Shatpala Gandhaka Churna* arethe main pharmaceutical procedures adopted in the preparation of *Shatpala Gandhaka Churna.*Standardization of *Ayurvedic* drugs at various levels starting from the selection and collection of raw material to the final product is essential to produce a safe and efficacious drug. Thereforein the present study an effort has been made to highlight the significance of these pharmaceutical procedures and to standardize the method of preparation of *Shatpala Gandhaka Churna*.

**AIMS AND OBJECTIVES:**

* To standardize the method of *Shatpala Gandhaka Churna*.

**MATERIALS AND METHODS:**

**Collection of Raw material:**

*Gandhaka* was obtained from Vijayawada. *Triphala*, *Trikatu* were obtained from TTD’s Sri Srinivasa Ayurvedic Pharmacy, Tirupati. *Vidanga*, *Bhallataka*, *Chitrakamula* *twak* were obtained from Chennai. *Trijataka*, *Chanaka*, *Jeeraka* were obtained from the local market, Tirupati.

**Methods:**

Entire preparation of *Shatpala* *Gandhaka* *Churna* was carried out in Depatment of *Rasa* *Shastra* and *Bhaishajya* *Kalpana*, TTD’s S.V. Ayurvedic College, Tirupati, Andhra Pradesh.

***Shatpala******Gandhaka******Churna*:**

Reference : *Vaidya Chintamani- Kushtha Roga Prakaranam*

Materials : *Shuddha Gandhaka* -1200 g

*Shuddha Bhallataka Churna* – 200 g

*Shuddha Chitrakamula twak* – 200 g

*Triphala Churna* – 200 g

*Vidanga Churna* – 200 g

*Trikatu Churna* – 200 g

*Trijataka Churna –* 200 g

*Chanaka churna* – 200 g

*Jeeraka churna –* 200 g

Method/ Principle : Shodhana and Churna Nirmana

Apparatus : Khalwa yantra, Gas stove, Iron ladle, Steel vessel, Cloth, Spoon

Jute bag, thread, steel vessel, tray, steel cutter.

**The entire pharmaceutical study was carried out in four stages:**

* **STAGE I**
  1. *Shodhana* of *Gandhaka*
  2. *Shodhana* of *Bhallataka*
  3. *Churnodaka Nirmana*
  4. *Shodhana of Chitrakamoolatwak*
* **STAGE II**

1. Preparation of *Triphala churna*
2. Preparation of *Vidanga churna*
3. Preparation of *Trikatu churna*
4. Preparation of *Trijataka churna*
5. Preparation of *Chanaka churna*
6. Preparation of *Jeeraka churna*

* **STAGE IV**

Mixing of all *Churna* to form homogenous mixture

* **STAGE V**

Making capsules of *Shatpala Gandhaka churna*

**1.*Gandhaka* *Shodhana*:**

**Ingredients:** *Ashuddha Gandhaka* – 1300 g, Milk – 10 litres, *Go ghrita* – Quantity Sufficient

Water – As required.

**Procedure:**

* Milk was taken in a glass vessel. A cloth was tied to its mouth. *Go ghrita* was taken in laddle and melted. *Gandhaka* was finely powdered and added to the molten *ghrita*. When the *Gandhaka* was melted completely, it was poured into milk through the cloth.. *Gandhaka* was taken out from milk and washed with hot water. After washing it was kept for drying and the same process was repeated for six more times (total 7 times). Fresh milk was taken each time.

**Observations:**

* On complete melting, *Gandhaka* changed into ghee like liquid.
* After *Shodhana, Gandhaka* colour was changed from dull yellow to thick, bright yellow colour with increased luster**.**

**2. *Bhallataka* *Shodhana*:**

**Ingredients:** *Asuddha Bhallataka-*5oo g

**Procedure:**

*Bhallataka* ripe seeds were taken and put in to water. Only those which sink were selected and used for the purification and rest were discarded. The upper cap like structure was removed with the help of steel cutter. The nuts were kept in a jute bag containing brick powder. Then jute bag was tied and rubbed until the irritant oil was absorbed by the brick powder. Then the seeds were washed thoroughly with hot water. Then it was dried in sunlight. After drying it was made into fine powder.

**Observations:**

* *Bhallataka* seeds were converted into small pieces.
* The jute bag taken was slightly wet with *Bhallataka taila.*
* Change in color of brick powder due to the absorption of *Bhallataka taila*.

**3*. Churnodaka******Nirmana*:**

**Ingredients:** *Sudha churna*-1g, Water - 240 ml

**Procedure:**

* 1 g of *Sudha churna* was taken in a vessel and added with 240ml of water, mixed thoroughly and left for 12 hours. Later, the supernatant water was taken out and filtered through filter paper and *Churnodaka* was obtained.

**Obesrvations:**

* *Churnodaka* - colourless liquid (similar to water) was collected.

**4*. Chitrakamoola twak Shodhana*:**

**Ingredients:** *Chitrakamoola twak-*300g, *Churnodaka*- As required

**Procedure:**

* *Chitrakamoola twak* was cleaned to remove external impurities if any. *Chitrakamoola twak* was taken in *khalwa yantra* and pounded. It was soaked in *Churnodaka* for one day and dried in sunlight.

**Observations:**

* Colour of the *Churnodaka* turned to orange colour.

**5*.Triphala Churna Nirmana:***

**Ingredients:** *Amalaki-*100g, *Haritaki*-100g , *Vibhitaki-*100g

**Procedure:**

* *Amalaki,Haritaki,Vibhitaki* were taken in equal quantities. Then these three drugs were taken separately in *Khalwa yantra* and made into powder and filtered through a cloth to get fine powder and mixed together.

**Observations:**

* *Triphala churna* obtained was very fine.

**6*.Vidanga churna Nirmana*:**

**Ingredients:** Vidanga-500 g

**Procedure:**

* *Vidanga* was checked for any external impurities, worms and insects and cleaned. Then it was subjected for powdering in Hammer crusher. Powder obtained from hammer crusher was shifted to Swifter machine for getting very fine powder of *Vidanga. Vidanga* powder obtained was kept in air tight jar.

**Observation:**

* Very fine powder of *Vidanga* was obtained.

**7*. Trikatu churna Nirmana*:**

**Ingredients:** *Shunti-*100g, *Pippali*-100g, *Maricha*-100g.

**Procedure:**

* Dried *Shunti, Maricha* and *Pippali* were collected. Then these drugs were grinded in a Pulverizer and made into powder separately. Then these three powders were sieved through swifter sieve separately and mixed together.

**Observations:**

* *Trikatu churna* obtained was very fine.

**8. *Trijataka Churna Nirmana*:**

**Ingredients:** *Twak* - 200g, *Ela*- 200 g, *Patra*- 200g.

**Procedure**:

* *Twak*, *Ela* and *Patra churna* were taken in equal quantities in a *Khalwa yantra* and mixed well to form a homogenous mixture.

**Observations**:

* *Trijataka churna* was obtained.

**9. *Chanaka Churna Nirmana*:**

**Ingredients:** *Chanaka*–300 g

**Procedure:**

* Dried *Chanaka* was checked for any external impurities, worms and insects and cleaned. It was taken in *Khalwa yantra* and pounded. Pounded material was sieved through a cloth to obtain very fine powder.

**Observations**:

* *Chanaka churna* obtained was light yellowish in colour.

**10. *Jeeraka churna Nirmana*:**

**Ingredients:** *Jeeraka*- 300g

**Procedure:**

* *Jeeraka* was cleaned to remove external impurities if any. It was pounded in *Khalva yantra* and filtered through a cloth to obtain fine powder.

**Observations:**

* *Jeeraka churna* obtained was very fine.

**11. Preparation of Homogenous mixture:**

**Ingredients:** *Shuddha Gandhaka* -1200 g

*Shuddha Bhallataka Churna* – 200 g

*Suddha Chitrakamula twak* – 200 g

*Triphala Churna* – 200 g

*Vidanga Churna* – 200 g

*Trikatu Churna* – 200 g

*Trijataka Churna –* 200 g

*Chanaka churna* – 200 g

*Jeeraka churna –* 200 g

**Procedure:**

* Fine *churna* obtained after practical No. 1,2,4,5,6,7,11, 12,13 were added one by one in *Khalwa yantra* and mixed well. Mixing was carried out till a homogenous mixture was obtained. It was collected and preserved in an air tight glass container.

**Observations:**

* Very fine homogenous mixture was obtained.

**12. Preparation of capsules of *Shatpala Gandhaka Churna*:**

**Ingredients:** Homogenous mixture of *Shatpala Gandhaka Churna-* 2790 g

**Procedure:**

* Capsules of uniform size were taken. 500 mg of *Shatpala Gandhaka Churna* was filled in each capsule and weighed. Capsules were preserved in absolute sterile and moisture free glass containers.

**Observations:**

* On average, one among every 100 capsules was damaged.

20

18

17

15

14

13

3

9

12

11

8

7

4

2

1

6

5

**IMAGES SHOWING THE PREPARATION OF *SHATPALA GANDHAKA* *CHURNA*:**

21

19

16

10

1-***Gandhaka* before *shodhana***

**2-Melting *Gandhaka***

**3-Pouring molten *Gandhaka* into milk**

**4-*Shoditha* *Gandhaka***

**5-Cutting cap like structure of *Bhallataka* seeds**

**6-*Bhallataka* seeds mixed with *Istika* *Churna***

**7-*Bhallataka* seeds after rubbing vigorously in a jute bag**

**8-*Shoditha* *Bhallataka* *churna***

**9-*Chitraka* *moola* *twak***

**10- *Churnodaka***

**11-Soaking *Chitraka* *moola* *twak* in *churnodaka***

**12-*Churnodaka* turned in to orange color**

**13-*Chitraka* *moola* dried in sunlight**

**14-*Shoditha* *chitraka* *moola* *twak* *churna***

**15-*Harithaki***

**16-*Vibhitaki***

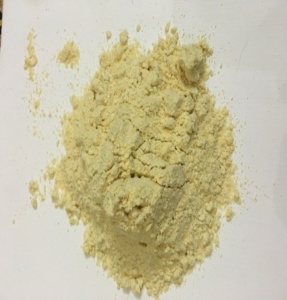
**17-*Amalaki***

**18-*Triphala* *churna***

**19-*Vidanga***

**20-*Vidanga* *churna***

**21-*Chanaka***

**  **  

34

31

33

32

35

29

28

30

27

26

25

22

23

24

**22- *Chanaka* *churna***

**23- *Jeerka***

**24-*Jeeraka* *churna***

**25-*Sunthi***

**26-*Pippali***

**27-*Maricha***

**28-*Trikatu* *churna***

**29-*Twak***

**30-*Ela***

**31-*Patra***

**32-*Trijataka* *churna***

**33-Mixing of *Gandhaka* and herbal drugs**

**34-Homogenous mixture of *Shatpala* *Gandhaka* *churna***

**35- Capsules of *Shatphala* *Gandhaka* *churna***

***Results:***

**Table No. 1: Showing the result of *Gandhaka Shodhana***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.no** | **Initial weight** | **Final weight** | **Loss in weight** | **Loss in percentage** |
| 1. | 1300 g | 1270 g | 30g | 2.3% |

**Table No. 2 : Showing the Result of *Bhallataka Shodhana***

|  |  |  |  |
| --- | --- | --- | --- |
| ***Initial Weight*** | ***Final Weight*** | ***Loss in Weight*** | **Loss in percentage** |
| ***500 g*** | ***260 g*** | ***240 g*** | ***48%*** |

**Table No. 3 : Showing the Result of *Churnodaka Nirmana***

|  |  |  |
| --- | --- | --- |
| **Ingredients** | **Quantity taken** | **Quantity of *churnodaka* obtained** |
| *Sudha Churna* | 1g | 230ml |
| Water | 240ml |

**Table No. 4 : Showing the Result of *Chitrakamoola twak Shodhana***

|  |  |  |  |
| --- | --- | --- | --- |
| ***We*ight of *Chitrakamoola twak*** | **Weight after *Shodhana*** | ***Loss in weight*** | **Loss in percentage** |
| ***300g*** | ***298g*** | ***2g*** | ***0.66%*** |

**Table No.5 : Showing the Result of *Triphala Churna Nirmana***

|  |  |  |  |
| --- | --- | --- | --- |
| **Weight Of drug taken** | **Final wt.** | **Loss in wt** | **Loss in percentage** |
| *Amalaki*-100g  *Haritaki*-100g  *Vibitaki*-100g | *Triphala* *churna*-280g | 20g | 6.6% |

**Table No.6: Showing the result of *Vidanga churna nirmana*:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial weight** | **Final weight** | **Loss in weight** | **Loss in percentage** |
| 500 g | 490g | 10g | 2% |

**Table No.7: Showing the result of *Trikatu churna nirmana***

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial Weight** | **Final Weight** | **Loss in Weight** | **Loss in percentage** |
| *Shunti*- 100g  *Pippali*- 100g *Maricha*- 100g | *Trikatu churna* – 270 g | 30 g | 10% |

**Table No. 8 : Showing the Result of *Trijataka Churna nirmana***

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial weight** | **Final Weight** | **Loss in Weight** | **Loss in percentage** |
| *Twak churna*- 200g  *Ela churna*- 200g  *Patra churna*- 200g | *Trijataka churna*– 595g | 5g | 0.83% |

**Table No. 9 : Showing the Result of *Chanaka Churna Nirmana***

|  |  |  |  |
| --- | --- | --- | --- |
| **Weight of *Chanaka* taken** | **Weight of *Chanaka churna obtained*** | **Loss in weight** | **Loss in percentage** |
| 300g | 295g | 5g | 1.66% |

**Table No. 10 : Showing the result of preparation of *Jeeraka Churna*:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial Weight** | **Final Weight** | **Loss in weight** | **Loss in percentage** |
| 300g | 280 g | 20g | 6.6% |

**Table No.11 : Showing the result of mixing of component drugs of *Shatpala Gandaka Churna*.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial Weight** | **Final Weight** | **Loss in Weight** | **Loss in percentage** |
| 2800 g | 2790 g | 10 g | 0.35% |

**Table No.16: Showing the result of Preparation of capsules of *Shatpala Gandhaka Churna*.**

|  |  |  |
| --- | --- | --- |
| **Weight of *Shatpala Gandhaka Churna*** | **No. of Total Capsules**  **(Each 500 mg)** | **No. of spoiled capsules** |
| 2790g | 5570 Capsules | 55 |

**DISCUSSION:**

Most of the materials of *Rasa Shastra* are obtained from mineral sources containing various impurities which are responsible for causing toxic effects to body tissues. Therefore as a rule the *Rasa dravyas* are purified first by a specialized processing technique known as *Shodhana* before subjecting them for the main processing. It is done to remove visible & invisible impurities, to reduce the toxicity and to enhance the therapeutic property.

***Gandhaka* *shodhana*:**

*Gandhaka Shodhana* was done according to the method that was mentioned in *Rasa Ratna* *Samucchaya*[2], which includes melting of *Gandhaka* in ghee and pouring into a vessel filled with milk through fine cloth. *Gandhaka* is highly *Pitta vardhaka*[3]. Both ghee and milk are *Vata Pitta shamaka dravyas*[4] and among them ghee is the drug of choice among fats in reducing *Pitta.* Therefore, these can reduce *‘teevra pitta vruddhikara’* effect of *Gandhaka.* Milk and Ghee are *Vishahara* and *Rasayana.* These can remove *Visha doshas* of *Gandhaka* and impregnate *Rasayana* property to *Gandhaka.*Final cleaning with hot water removes greasy remnants of milk and ghee.

***Churnodaka Nirmana* :**

*Churnodaka Nirmana* was done according to the method that was mentioned in *Rasatarangini.***[**5] 1g of *Sudha churna* was taken in a vessel and added with 240ml of water, mixed thoroughly and left for 12 hours. Later, the supernatant water was taken out and filtered through filter paper and *Churnodaka* was obtained.

***Chitrakamula twak Shodhana*:**

*Chitrakamula twak Shodhana*, was done according to the method that was mentioned in *Rasatarangini.***[**6] *Chitrakamoola twak* was cleaned to remove external impurities if any.*Chitrakamoola twak* was taken in *khalwa yantra* and pounded. It was soaked in *Churnodaka* for one day and dried in sunlight. Colour of the *Churnodaka* turned to orange colour. *Shodhana* reduces the *teekshnatva* of *Chitrakmoola*.

***Bhallataka*** ***Shodhana***:

*Bhallataka Shodhana* was done according to the reference *Rasa tarangini.***[**7] *Bhallataka* seeds are rubbed with *Istika churna* in a jute bag. In Ayurvedic literature, the synonym *Shopha hetu, Spota hetu, agnika* are given to this drug based on its blister causing nature. **[**8] The oil in the fruit is responsible for the irritation. **[**9] The fruit contains tarry oil which causes contact dermatitis. Medically it is named as Urushiol Induced Contact Dermatitis because the chemical Urushiol is responsible for the dermatitis. This vesicant nature is removed while doing *Shodhana* with *Istika* *churna*. The oil in the fruit is responsible for the irritation.The *Bhallataka* fruit contains 90% Anacardic acid and 10% of Cardol. Other chemical constituents are bhilawanol **[**10], semecarpol **[**11] and anacordol **[**12]. Recent studies reported that bhilawanols are known as urushiols. Anacardic acids are closely related to urushiol. Another study reported that the corrosive juice from the pericarp of the fruit is found to contain catechol, fixed oil and anacardol (C18H13O3.COOH) to which the corrosive properties of the juice are due to two phenolic acids C16H15O3.COOH and C14H13O3.COOH**[**13] . Brick powder is having adsorbant property so corrosive oil present in the fruit is absorbed by the brick powder.

***Churna nirmana*** **of herbal drugs:**

*Shuddha Bhallataka, Shuddha Chitrakamulatwak, Triphala, Vidanga, Trikatu, Trijataka, Chanaka, Jeeraka* were made into fine powder, according to the Churna kalpana reference mentioned in *Sharangadhara* *Samhita* *Madhyama* *Khanda***[**14].

**Preparation of homogenous mixture of all component drugs :**

*Gandhaka* obtained after *shodhana* and the fine powders of herbal drugs were mixed in the ratio as mentioned in the reference sloka to obtain the homogenous mixture of *Shatpala Gandhaka Churna*.

**Preparation of *Shatpala Gandhaka Churna* Capsules:**

Capsules of uniform size were taken.500 mg of *Shatpala Gandhaka Churna* was filled in each capsule and weighed. Capsules were preserved in absolute sterile and moisture free glass containers. Capsule form was selected keeping in view of ingredients like *Twak*, *Ela* and *Patra*, which contain volatile oils, which may lose their potency on making tablets. Hence, *Shatpala Gandhaka Churna* was given in the form of capsules to the patients in the prescribed dose.

**CONCLUSION:**

Pharmaceutical standardization of *Rasa oushadis* is an important requisite for the establishment of their efficacy and consistent biological activity. The pharmaceutical procedures involved in this is study are *Shodhana*, *Churna* *nirmana* and Preparation of capsules of *Shatpala* *Gandhaka* *Churna. Shodhana* plays a vital role by removing the toxic nature and improving the therapeutic efficacy , there by rendering a safe and effective formulation.

**REFERENCES:**

1*.*Dr.K.RamaChandraReddy*.*Vaidya chintamani Vol. II ( Sula prakaranam to Parinama prakaranam ) 1st edition; Golghar, Varanasi; Chaukamabha Orientalia; 2014. P. 400.

2. Dr. Indradev Tripati. Rasa Ratna samucchaya; Edition :Reprint-2013; Golghar, Varanasi; Chaukambha Sanskrit Sansthan;P.28.

3. Acarya Sri Madhava, Ayurveda Prakasha, edited with the Arthavidyotani and Arthaprakasini Sanskrit and Hindi commentaries by Shri Gulraj Sharma Mishra, Chaukhambha Bharati Academy, Varanasi, reprint edition 2014. P. 259.

4. K. R. Srikantha Murthy, Bhava prakasha of Bhavamisra; English Translation; Vol-1; Varanasi; Chaukambha Krishnadas Academy, reprint edition 2011. P. 454 and 470.

5. Pandit Kaseenatha Sastrina; Rasa Tarangini; 11th edition; Chouka, Varanasi; Mothilala Banarasidasa; P.280

6.Pandit Kaseenatha Sastrina; Rasa Tarangini; 11th edition; Chouka, Varanasi; Mothilala Banarasidasa; P.753

7. Pandit Kaseenatha Sastrina; Rasa Tarangini; 11th edition; Chouka, Varanasi; Mothilala Banarasidasa; P.735

8. Bapalal G Vaidya; Nighantu Adarsha; Vol.1.1st edition; Varanasi: Chaukhamba Bharati Academy; 2007.p.31

9. Govindhan;Chief editor Dr. C. R. Agnivesh, Editors- Dr. P. Unnikrishnan, Dr. George M.J. Vishavaidya Jyotsnika-An English Translation. 1st edition; Department of Agadatantra ;Vaidyaratnam P. S. Varier Ayurveda College, Kottakal. 2002. P. 200-201.

10. Naidu, D.S. 1925. Constituents of the marking-nut: *Semecarpus anacardium* Linn. *Journal of Indian Institute of Science* 8: 129–14

11. C.P. Khare, editor. Indian Medicinal Plants- An illustrated Dictionary; Springer science; 1st edition; New Delhi, India; Private Limited; 2007.p.597.

12. Nagabhushanaa, K.S, Umamaheshwari, S.,Tocolic F.E., Prabhu S.K., Green, I.R. and Ramadoss C. S. Inhibition of soybean and potato Lipoxygenases by Bhilawanols from Bhilawan (*Semecarpus anacardium*) nut shell liquid and some synthetic Salicylic acid analogues. *Journal Enzyme Inhib. Medical Chemistry* 2002; 17(4): 255–259.

13. Naidu D.S. Constituents of the marking-nut:*Semecarpusanacardium*Linn. *Journal of Indian Institute of Science* 1925; 8:129– 142.

14. Pandit Dwarakanath Misra Sastri; Sharangadhara Samhitha Madhyama Khanda-1st edition; Golghar, Varanasi; Chaukambha Krishnadas Academy; 2010. P. 280.