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Research Article

PHARMACEUTICAL STANDARDIZATION AND ANALYTICAL PROFILING OF *BRIHATYADI VARTI ANJANA*: A CLASSICAL AYURVEDIC OPHTHALMIC FORMULATION

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ABSTRACT

Brihatyadi Varti Anjana is a formulation mentioned in *Chakradatta, Netrarogadhikara* indicated for *Vataja Abhishyanda*. Since ophthalmic formulations are applied directly to the ocular surface, ensuring their quality, purity, safety, and reproducibility through standardization is essential. **Objective:** To establish quality control parameters of *Brihatyadi Varti Anjana* by organoleptic, physicochemical, microbiological, and High Performance Thin Layer Chromatography (HPTLC) evaluation. **Methods:** The formulation was prepared following Standard Operating Procedures (SOP). Physicochemical analysis was conducted to determine organoleptic properties, loss on drying, total ash content, acid-insoluble ash, pH value, and water/alcohol-soluble extractive values. High-Performance Thin Layer Chromatography (HPTLC) was employed to establish chromatographic fingerprint. **Results:** The formulation appeared as a brown coloured *Varti* with a characteristic odour. Physicochemical evaluation demonstrated low moisture content (1.15±0.01%), total ash (3.12±0.01%), absence of acid-insoluble ash, water-soluble ash (1.80±0.02%), alcohol-soluble extractive value (22.0±0.01%), water-soluble extractive value (38.0±0.01%), and pH of 6.0. Microbial limit testing showed compliance with the applicable permissible limits. HPTLC analysis produced a chromatographic fingerprint with characteristic bands under short UV and long UV, indicating the presence of multiple phytoconstituents. **Conclusion:** The findings of the study provide reference quality control parameters for the standardization of *Brihatyadi Varti Anjana.* These findings provide a foundation for future clinical research and further pharmaceutical and regulatory standardization of this classical ophthalmic formulation.

INTRODUCTION

Ophthalmic drug delivery in classical Ayurveda is governed by specialized therapeutic procedures known as *Netra Kriyakalpa*, designed to target localized ocular pathologies. Among these procedures, *Anjana Karma* is the topical application of the medicated formulation to the inner margin of the lower eyelids, serves as an essential non-invasive topical delivery method.

Brihatyadi Varti Anjana is a classical formulation described in *Chakradatta*[1] for the management of *Vataja Netra Rogas*, particularly *Vataja Abhishyanda*. The formulation comprises three roots i.e., *Shweta Brihati* (*Solanum torvum Sw.*), *Erandamoola* (*Ricinus communis L.*), *Shigrumoola* (*Moringa oleifera Lam.*) and *Saindhava Lavana* (purified rock salt) and triturated (*Bhavana*) in *Aja Ksheera* (goat's milk). These ingredients predominantly possess *Vata-Kaphahara*, *Shothahara*, and *Chakshushya* properties.

As the medication is directly applied to delicate ocular tissues, quality assurance assumes even greater importance. Although *Brihatyadi Varti Anjana* has classical therapeutic indications, comprehensive analytical standardization data for this formulation remain limited. Standardization of Ayurvedic ophthalmic formulations requires systematic evaluation through organoleptic examination, physicochemical analysis, microbiological assessment, and chromatographic fingerprinting.[2]

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Physicochemical parameters such as moisture content, ash values, extractive values, and pH provide valuable information regarding identity, purity, stability, and pharmaceutical quality. Similarly, microbial limit testing ensures microbiological safety for ophthalmic use, while High Performance Thin Layer Chromatography (HPTLC) provides a characteristic chromatographic profile that can be used as a tool for authentication and comparison in future quality-control studies.[3] Establishing scientific quality control parameters for classical formulations has become an essential component of contemporary Ayurvedic pharmaceutical research.

Therefore, the present study was undertaken to establish analytical quality-control parameters for *Brihatyadi Varti Anjana.* The analytical data generated serve as reference quality control parameters for authentication, pharmaceutical quality assurance, and future standardization of this classical Ayurvedic ophthalmic formulation.

METHODOLOGY

Authentication of the raw drug and Preparation of the formulation

The raw drugs required for the preparation of *Brihatyadi Varti Anjana* were procured from an identified vendor, authentication and preparation of the formulation was done in the Teaching Pharmacy of SDM Institute of Ayurveda and Hospital, Bengaluru.

Fine powder of the drugs namely *Shweta Brihati, Erandamoola, Shigrumoola, Saindhava Lavana,* 50g each (Fig. 1-4) were taken mixed together to get a Homogeneous mixture. 400ml of *Aja Ksheera* (Fig. 5) and *Bhavana* was done (Fig. 6). *Bhavana* procedure was continued until the *Kalka* attained *Subhavitha Lakshanas.*[4] The *Subhavitha Kalka* was rolled into *Varti* of size of 2cm and were dried under shade. Once the *Vartis* were properly dried it was stored in an air tight container (Fig. 7*)*. The ingredients and proportions of the formulation are summarized in Table 1.

Table 1: **Ingredients and proportion of *Brihatyadi Varti Anjana***

S.No.	Sanskrit name	Botanical name	Part used	Proportion
1	*Shweta Brihati*	*Solanum torvum* Sw.	Root	50g
2	*Erandamoola*	*Ricinus communis* L.	Root	50g
3	*Shigru moola*	*Moringa oleifera* Lam.	Root	50g
4	*Saindhava*	-	Mineral Salt	50g
5	*Aja ksheera*	-	Milk	~400ml



Fig. 1. *Brihati*



Fig. 2. *Erandamoola*

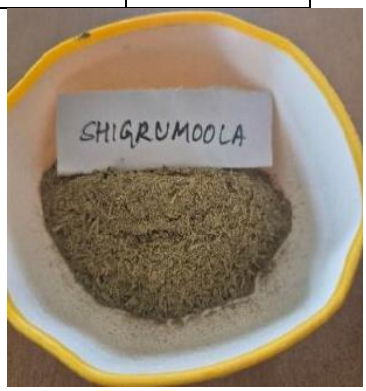


Fig. 3. *Shigrumoola*



Fig. 4. *Saindhava Lavana*



Fig. 5. *Aja Ksheera*



Fig. 6. *Bhavana*



Fig. 7. Drying and Packing

Analytical Study

The analytical study of the trial drug *Brihatyadi Varti Anjana* was done at Shri Dharmasthala Manjunatheshwara Institute Centre for Research in Ayurveda and Allied Sciences, Udupi. The methodology for testing is as under:

Physicochemical evaluation

Organoleptic Evaluation

The finished formulation was evaluated for observable organoleptic characteristics including colour and odour prior to analytical testing.

Loss on drying at 105°C

10 grams of *Brihatyadi Varti* were accurately weighed and transferred into a previously dried and weighed evaporating dish. The sample was dried in a hot air oven maintained at 105°C for 5 hours and weighed after cooling in a desiccator. Drying was continued with intermittent weighing until the difference between two consecutive weights was not more than 0.01gm. The percentage loss on drying, representing the moisture content, was calculated with reference to the initial weight of the sample.[5]

Total Ash

2 grams of *Brihatyadi Varti* were accurately weighed and incinerated in a tared platinum crucible at a temperature not exceeding 450°C until a carbon-free ash was obtained. The crucible was cooled in a desiccator and weighed. The total ash value was calculated as a percentage of the air-dried sample.[6]

Acid insoluble Ash

To the crucible containing the total ash, 25ml of dilute hydrochloric acid was added and the mixture was boiled gently. The insoluble residue was collected on ash less Whatman No. 41 filter paper and washed thoroughly with hot water until the filtrate became neutral. The filter paper along with the residue was transferred to the original crucible, dried, and ignited to constant weight. After cooling in a desiccator for 30 minutes, the crucible was weighed. The acid insoluble ash content was expressed as a percentage of the air-dried sample.[6]

Water soluble ash

The total ash obtained was boiled with 25ml of distilled water for 5 minutes. The insoluble matter was collected on ash less filter paper, washed with hot water, and ignited at a temperature not exceeding 450°C for 15 minutes. The weight of the insoluble residue was subtracted from the weight of the total ash. The difference represented the water-soluble ash and was calculated with reference to the air-dried sample.[6]

Alcohol soluble extractive

4 grams of accurately weighed *Brihatyadi Varti Anjana* were placed in a stoppered flask containing 100 mL of 95% ethanol. The mixture was shaken intermittently during the first 6 hours and then allowed to stand undisturbed for 18 hours. The solution was filtered rapidly to avoid solvent loss. 25ml of the filtrate were transferred to a pre-weighed beaker and evaporated to dryness on a water bath. The residue was further dried in a hot air oven at 105°C for 6 hours, cooled in a desiccator, and weighed. The percentage of alcohol soluble extractive was calculated. The procedure was performed in triplicate and the mean value was recorded.[6]

Water soluble extractive

4 grams of the sample were accurately weighed and macerated with 100ml of distilled water in a stoppered flask. The mixture was shaken occasionally for 6 hours and allowed to stand for an additional 18 hours. After filtration, 25ml of the filtrate were transferred to a pre-weighed beaker and evaporated to dryness on a water bath. The residue was dried in a hot air oven at 105°C for 6 hours, cooled in a desiccator, and weighed. The water-soluble extractive value was calculated as a percentage of the sample weight. The experiment was repeated three times and the average value was taken.[5]

Determination of pH

Standard buffer solutions of pH 4.0, 7.0, and 9.2 were prepared by dissolving the respective buffer tablets in 100ml of distilled water. For sample preparation, 1ml of the test sample was diluted to 10ml with distilled water, mixed thoroughly, and filtered. The pH meter was switched on and allowed to stabilize for 30 minutes. Calibration was performed using pH 4.0 and pH 7.0 buffer solutions, while the pH 9.2 buffer was used to verify the accuracy of calibration. The prepared sample solution was then analysed and the pH reading was recorded. The determination was carried out four times and the average value was reported.[7]

Total Aerobic Microbial Count (TAMC)

Microbiological evaluation was conducted at BTH Laboratories Pvt. Ltd, Bengaluru following the protocols specified in the Ayurvedic Pharmacopoeia of India (API).[8]

High Performance Thin Layer Chromatography (HPTLC)

One gram of powdered sample of *Brihatyadi Varti Anjana* was dissolved in 10ml ethanol and was warmed, filtered. 3, 6 and 9µl of the above filtrate was applied on a pre-coated silica gel F_{254} on aluminium plates to a band width of 7mm using Linomat 5 TLC applicator. The plate was developed in Cyclohexane: Ethyl acetate: Formic acid (6.0:4.0:1.0). The developed plates were visualized in short UV, Long UV and then derivatised with Vanillin Sulphuric Acid (VSA) reagent and scanned under UV 254nm, 366nm and 620nm. Rf, colour of the spots and densitometric scan were recorded.

OBSERVATION AND RESULTS

Physicochemical evaluation

The finished *Brihatyadi Varti Anjana* appeared brown in colour and exhibited a characteristic odour. The quantitative physicochemical values of the formulation are presented in mean ± SD. The results of Organoleptic examination and physicochemical parameters are summarized in Table 2 and 3

Table 2: Results of organoleptic examination

Parameters	Results
Color	Brown
Odour	Characteristic

Table 3: Results of physicochemical parameters

Parameters	Experimental Results (%w/w±SD)
Loss on drying (LOD) at 105˚C	1.15±0.01
Total ash	3.12±0.01
Acid-insoluble ash	0.0±0.0
Water-soluble ash	1.80±0.02
Alcohol-soluble extractive value	22.0±0.01
Water-soluble extractive value	38.0±0.01
pH (aqueous filtrate)	6.0

Total Aerobic Microbial Count (TAMC)

The formulation complied with the permissible microbial limits for TAMC under the test conditions (Table 4).

Table 4: Results of Total Aerobic Microbial Count

S.No.	Test Parameter	Units	Test Results	Limits	API Standard
1	TAMC	Cfu/g	2500	Not more than 1000000	API (Part 1) 2022 Volume –IX 1st edition

High Performance Thin Layer Chromatography (HPTLC)

The ethanolic extract demonstrated distinct chromatographic bands under 254nm and 366nm. At 254nm, bands were observed at Rf values of 0.21, 0.34 and 0.50. At 366nm, fluorescent bands were observed at 0.33, 0.39, 0.44 and 0.50. No distinct band was recorded in the reported Rf table after derivatization (Fig. 8).

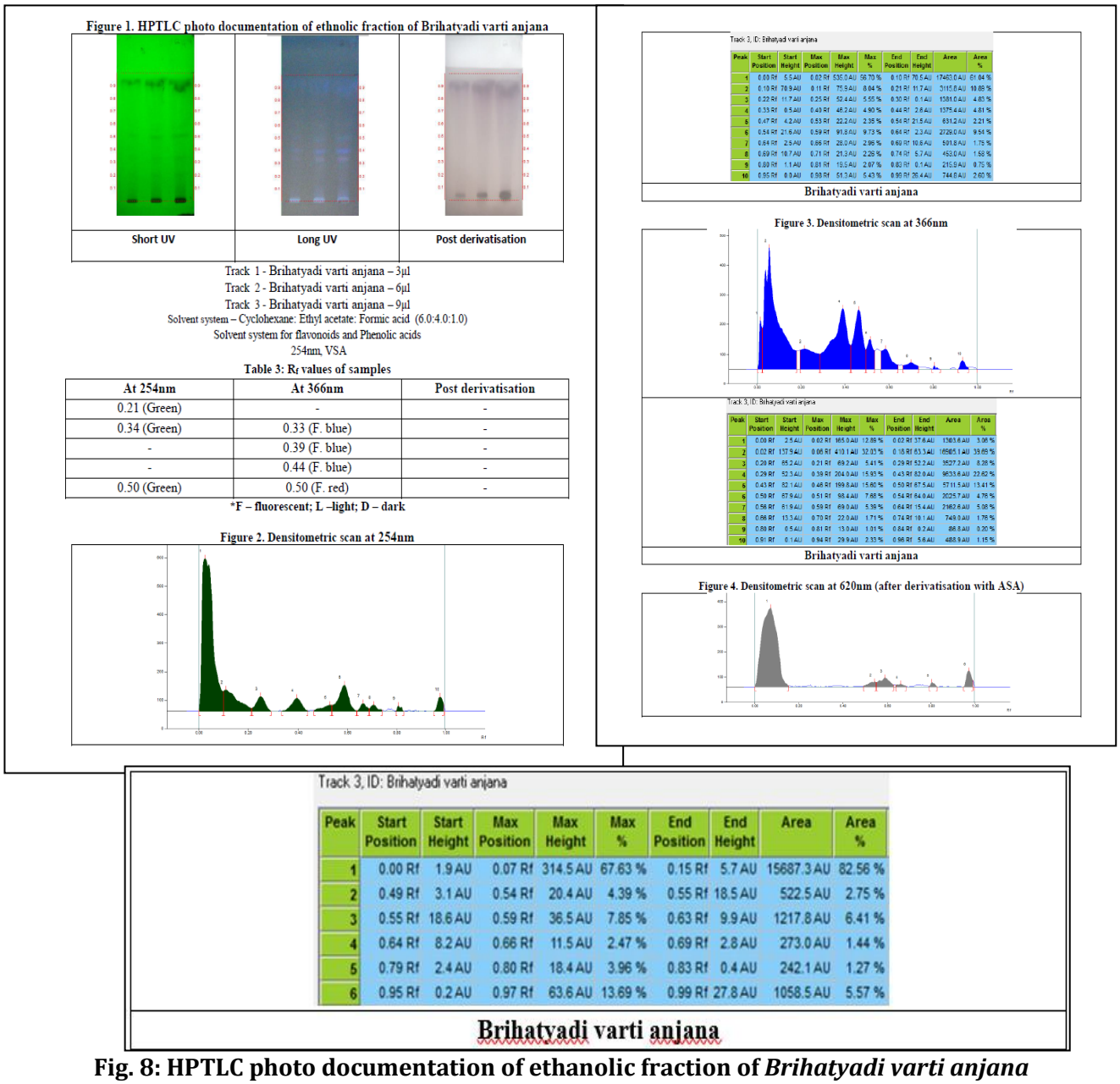


Fig. 8: HPTLC photo documentation of ethanolic fraction of *Brihatyadi varti anjana*

DISCUSSION

Discussion on Results of Physicochemical Parameters

The formulation exhibited a brown colour and characteristic odour, providing basic identifying characteristics of the finished *Varti.*

- The low loss on drying value (1.15% w/w) indicates minimal moisture content in *Brihatyadi Varti Anjana*, which contributes to better stability, longer shelf life and reduced chances of microbial contamination.
- The total ash value (3.12% w/w) and water-soluble ash value (1.80% w/w) reflect the presence of physiological minerals derived from the herbal ingredients, *Saindhava Lavana* and *Aja Ksheera*. These values indicate the purity and mineral content of the formulation.

- The acid-insoluble ash value was found to be 0%, indicating the absence of extraneous siliceous matter such as sand and soil. This is particularly important for an ophthalmic formulation, as abrasive particles may irritate the ocular surface and compromise patient comfort.
- The water-soluble extractive value (38.0±0.01% w/w) was higher than the alcohol-soluble extractive value (22.0±0.01% w/w), indicating a greater proportion of constituents extractable in water under the specified experimental conditions. These values may serve as useful physicochemical reference parameters for assessment of formulation consistency
- The pH of the formulation was found to be 6.0, Since pH is an important physicochemical parameter for ophthalmic formulations, its determination provides useful information regarding ocular compatibility and formulation characteristics. Although the physiological tear pH is approximately 7.4, ophthalmic preparations may be formulated over a broader pH range depending on formulation properties, buffering capacity and ocular tolerance.
- Overall, the physicochemical findings provide a defined analytical profile of the tested batch and contribute to its pharmaceutical quality assessment.

Discussion on HPTLC

The HPTLC profile should primarily be interpreted as a fingerprint for the formulation rather than as definitive identification of individual compounds, because no reference-standard co-chromatography or quantitative marker estimation was performed in the reported analysis. Table 5 shows the chromatographic profile of the formulation and possible compounds.

Table 5: Detailed description on Chromatographic profile on *Brihatyadi Varti Anjana*

Light Source	Chromatographic Rf Values	Color / Appearance of Bands	Possible phytochemical Class / Compound Origins
Short UV (254nm)	0.21	Green	Polar phenolic acids or flavonoids. Rutin, kaempferol, quercetin
	0.34	Green	Flavonoid glycosides from *Brihati* or *Shigru*.
	0.50	Green	Medium-polarity terpenes or steroidal alkaloids.
Long UV (366nm)	0.33	Fluorescent Blue	Coumarins or highly conjugated phenolics.
	0.39	Fluorescent Blue	Phenolic acids from root extracts.
	0.44	Fluorescent Blue	Active flavones or saponin derivatives. gallic acid
	0.50	Fluorescent Red	Steroidal alkaloids (e.g., solasodine) or chlorophyll-type residues.
Post-Derivatisation (VSA, 620nm)	-	-	-

The solvent Cyclohexane: Ethyl acetate: Formic acid (6.0:4.0:1.0) is specifically optimized for resolving flavonoids, phenolic acids, steroidal alkaloids, and moderately polar lipophilic secondary metabolites. Based on comparison with previously reported HPTLC profiles and the known phytochemical composition of the constituent drugs[9-11], flavonoids such as quercetin and kaempferol may be considered possible constituents; however, their identity cannot be conclusively established from Rf values alone. Confirmation would require co-chromatography with authentic standards under identical chromatographic conditions and comparison of their UV spectra.

CONCLUSION

Brihatyadi Varti Anjana demonstrated characteristic organoleptic features and defined physicochemical parameters, including low loss on drying, low total ash, absence of detectable acid-insoluble ash, higher water-soluble than alcohol-soluble extractive value. The formulation complied with the applicable microbiological limits reported by the analytical laboratory. HPTLC analysis generated a characteristic fingerprint with reproducible Rf bands under 254nm and 366nm detection.

The combined analytical profile provides preliminary quality-control parameters for *Brihatyadi Varti Anjana* and may be useful for authentication, quality assessment and comparison of future batches. Further studies involving multiple batches, validated marker-based chromatographic estimation and additional ophthalmic quality parameters would strengthen the establishment of comprehensive standards for this classical formulation.

Limitations

The present study represents analytical evaluation of a single prepared batch of *Brihatyadi Varti Anjana*. Therefore, the reported values should be considered preliminary reference parameters rather than definitive pharmacopoeial limits. HPTLC analysis was used for fingerprinting, and individual phytoconstituents were not conclusively identified or quantitatively estimated using reference standards. Further multi-batch studies and validated quantitative analytical methods are required to establish robust standardization parameters.

REFERENCES

1. Sharma PV, editor and translator. Cakradatta: Sanskrit text with English translation; a treatise on principles and practices of Ayurvedic medicine. Delhi: Chaukhambha Orientalia; 2013. Netra Roga Chikitsa, Chapter 59, Verse 20, p. 484.
2. Gupta SP, Vaghela DB, Harisha CR, Shukla VJ. Pharmacognostical and phytochemical evaluation of Gutika Anjana: an ocular Ayurvedic formulation. American Journal of PharmTech Research. 2018; 8(4). doi:10.46624/ajptr.2018.v8.i4.022.
3. Koll K, Reich E, Blatter A, Veit M. Validation of standardized high-performance thin-layer chromatographic methods for quality control and stability testing of herbals. Journal of AOAC International. 2003; 86(5). doi:10.1093/jaoac/86.5.909.
4. Parashurama shastri Vidyasagar, editor. Sharangadhara Samhita of Sharangadhara, Madhyama khanda; Gutika Kalpana; chapter 7, verse 1-3, Varanasi: Chaukambha Krishnadas Academy, 2013; 101-102
5. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. The Ayurvedic Pharmacopoeia of India. Part II. Vol. II. 1st ed. New Delhi: Department of AYUSH; 2008. p.161
6. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. The Ayurvedic Pharmacopoeia of India. Part II. Vol. II. 1st ed. New Delhi: Department of AYUSH; 2008. p.160
7. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. The Ayurvedic Pharmacopoeia of India. Part II. Vol. I. 1st ed. New Delhi: Department of AYUSH; 2008. p.191
8. Government of India, Ministry of Health and Family Welfare, Department of AYUSH. The Ayurvedic Pharmacopoeia of India. Part I. Vol. VI. 1st ed. New Delhi: Department of AYUSH; 2008.p.280
9. Yousaf Z, Wang Y, Baydoun E. Phytochemistry and pharmacological studies on Solanum torvum Swartz. Journal of Applied Pharmaceutical Science. 2013; 3(4): 152-160. doi:10.7324/japs.2013.3428.
10. Pareek A, Pant M, Gupta MM, Kashania P, Ratan Y, Jain VK, et al. Moringa oleifera: an updated comprehensive review of its pharmacological activities, ethnomedicinal, phytopharmaceutical formulation, clinical, phytochemical, and toxicological aspects. International Journal of Molecular Sciences. 2023; 24(3): 2098. doi:10.3390/ijms24032098.
11. Abdul WM, Hajrah NH, Sabir JSM, Al-Garni SM, Sabir MJ, Kabli SA, et al. Therapeutic role of Ricinus communis L. and its bioactive compounds in disease prevention and treatment. Asian Pacific Journal of Tropical Medicine. 2018. doi:10.4103/1995-7645.228431.

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