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COMPARATIVE ANALYTICAL EVALUATION OF *ERANDA TAILA* EXTRACTED FROM *SHODHITA* AND *ASHODHITA ERANDA TAILA*

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ABSTRACT

Eranda Taila (Castor oil), obtained from the seeds of *Ricinus communis Linn.*, is a widely used oil in Ayurveda. The classical text *Yogaratnakara* describes the *Shodhana* (purification) procedure of *Eranda beeja*, through *Swedana* (steaming) in *Narikelodaka* (tender coconut water) for a duration of three hours. *Shodhana* procedures not only reduce the toxicity of a drug but also modifies its undesirable properties and enhances its therapeutic efficacy. The strong laxative property of castor oil is due to the local irritant action caused in the intestines by the ricinoleic acid. This study aimed to compare phytochemical screening, physicochemical parameters and HPLC of *Shodhita* and *Ashodhita Eranda Taila*, which were extracted from *Shodhita* and *Ashodhita Eranda beeja* respectively, using the traditional method of castor oil extraction. HPLC analysis of ricinoleic acid was conducted using the Shimadzu Prominence system. Phytochemical screening revealed that both samples contained glycosides, tannins and steroids. *Shodhita Eranda Taila* was found to have greater acid value, greater iodine *A*value, and higher saponification value as compared to *Ashodhita Eranda Taila*. The HPLC analysis indicated that *Shodhita Eranda Taila* had higher levels of ricinoleic acid compared

to *Ashodhita Eranda Taila*, which underscores the advantage of *Shodhana* in enhancing therapeutic properties of the drug.

KEYWORDS: *Shodhita Eranda Taila, Ashodhita Eranda Taila, Shodhana, Narikelodaka, Eranda beeja,* Ricinoleic acid, HPLC.

INTRODUCTION

Eranda Taila (Castor oil), obtained from the seeds of *Ricinus communis Linn.*, is a widely used oil in Ayurveda. It is commonly used in *Amavata*, *Vata Vyadhi*, and as an effective *Anulomana dravya*. Acharya Charaka has considered it as the best *Taila* for *Virechana* (purgation).[1]

The classical text Yogaratnakara describes the *Shodhana* (purification) procedure of *Eranda beeja*.[2] A similar reference is also found in Rasatarangini.[3] Both texts recommend *Swedana* (steaming) of *Eranda beeja* in *Narikelodaka* (tender coconut water) for a duration of three hours. *Shodhana* procedures not only reduce the toxicity of a drug but also modifies its undesirable properties and enhances its therapeutic efficacy.

According to Acharya Sushruta, *Eranda Taila* has *Madhura* and *Katu Rasa* (sweet and pungent taste), *Kashaya Anurasa* (astringent after-taste) and *Ushna Virya* (hot potency). It has the ability to enter minute channels, and does *Sroto Vishodhana* (clears obstructed channels), *Tvachya* (beneficial to skin), *Vrushya* (aphrodisiac), *Vayah Sthapana* (anti-aging), *Yoni Vishodhana* (purifies female genital tract), *Shukra Vishodhana* (purifies semen), *Arogyakara* (promotes health), *Medhakara* (enhances intelligence), *Kantikara* (enhances luster), *Smritikara* (enhances memory), *Balakara* (promotes strength), alleviates *Vata-Kapha*, and *Adhobhaga Doshahara* (eliminates impurities through purgation).[4]

Narikelodaka (tender coconut water) has *Madhura Rasa* (sweet in taste), *Snigdha* (unctuous), *Laghu* (lightness) *Gunas* and *Shita Veerya* (cold in potency). It acts as aphrodisiac, mitigates thirst, *Vata* and *Pitta* disorders, increases digestive power and purifies the urinary bladder.[5]

Castor seeds are reported to contain certain toxic principles. The chief poisonous component is ricin, a highly potent protein with well-documented toxicity in both humans and animals. In addition, castor seeds contain allergenic substances that are often more resistant to inactivation than ricin itself. Another constituent, ricinine, is a pyridine alkaloid with comparatively mild toxic activity but still regarded as undesirable. Toxic symptoms of ricin

(or castor seed) poisoning, which do not often appear for several hours after ingestion, consist of vomiting, colic, hemorrhagic gastro-enteritis, stupor, convulsions, oedema and circulatory collapse. Ricin also causes an extensive inflammation of the eyes.[6] However, these toxic components are confined only to the seed coat of castor seeds. The oil obtained by conventional methods is generally free from such toxins, whereas cold-pressed oil may retain them, with reported levels reaching up to 35 ± 13 µg/l.[7]

Castor oil is known to consist of up to 90% ricinoleic, 4% linoleic, 3% oleic, 1% stearic, and less than 1% linolenic fatty acids.[8] The strong laxative property of castor oil is due to the local irritant action caused in the intestines by the ricinoleic acid.

An experimental study on the toxicity of *Eranda beeja* in mice reported that the LD_{50} value increased after *Shodhana*, indicating a reduction in toxicity.[9] However, no analytical studies have been conducted on the *Taila* extracted from *Shodhita Eranda beeja*. Therefore, the present study was undertaken to evaluate its physicochemical parameters, phytochemical profile, and HPLC analysis in comparison with that of *Ashodhita Eranda Taila*.

MATERIALS AND METHODS

Collection and identification of raw drugs

Eranda beeja was procured from a certified Ayurveda raw drug supplier, and tender coconut from a local market. The drugs were authenticated by the experts from the Department of Dravyaguna at the Educational Institute.

The pharmaceutical processing was conducted at the Teaching Pharmacy of the Institution. The phytochemical tests were performed at Central Ayurveda Research Institute. The physicochemical tests and HPLC were performed in an NABL Certified Lab.

Preparation of samples

Sample 1 (S1) - The *Shodhana* of *Eranda beeja* was done according to Yogaratnakara. Decorticated *Eranda beeja* was tied in a cloth to make *pottali*. This was kept immersed in *Narikelodaka*, and *Swedana* was performed by heating it for three hours. From these seeds, *Eranda Taila* was extracted using the traditional method of castor oil extraction. The obtained oil was named *Shodhita Eranda Taila*. It was light brown in colour, had sweetish odour, which was less nauseating, with mild odour of coconut and castor. It had mild astringent taste, was less greasy and less viscous as compared to the other sample.[10]

Sample 2 (S2) - *Eranda Taila* was prepared from decorticated *Eranda beeja* using the traditional method of castor oil extraction. This was named *Ashodhita Eranda Taila.* It was creamish yellow in colour, with strong characteristic nauseating odour of castor. It had bland taste, was more greasy and more viscous.[10]

Phytochemical tests

Qualitative phytochemical tests were done on both the samples to detect the presence of alkaloids, glycosides, tannins, flavonoids, steroids, saponins and anthraquinone.

1. Detection of alkaloids: 2 mL of oil was added with 1 mL of Dragendorff's reagent in a test tube. The appearance of reddish-brown color indicates the presence of alkaloids.
2. Detection of glycosides: It was done using the Keller Kiliani test. In a test tube, 2.5 mL of the sample was combined with 1 mL of glacial acetic acid. A few drops of ferric chloride were added into the test tube, followed by the addition of 1 mL of concentrated sulphuric acid. The formation of a brown ring at the interface indicates the presence of glycosides.
3. Detection of tannins: It was done according to the method put forth by Edeoga. 1mL of oil was boiled in 20 mL of distilled water, and filtration was done. A few drops of 0.1% freshly prepared ferric chloride and sodium hydroxide were added to the test tube containing the filtrate. The appearance of bluish black or brownish black color indicates the presence of tannins.
4. Detection of flavonoids: The alkaline reagent test was adopted. Two to three drops of sodium hydroxide were added to the test tube containing 2 ml of the extract. Appearance of a deep yellow color initially, which gradually becomes colorless by adding a few drops of dilute hydrochloric acid, indicates the presence of flavonoids.
5. Detection of steroids: It was done using the Salkowski test. The extract was taken in a test tube and was shaken with chloroform. Concentrated sulphuric acid was added along the walls of the test tube. Appearance of red color indicates the presence of steroids.
6. Detection of saponins: This method was also given by Edeoga. 2mL of the sample was boiled in 20 mL distilled water in a water bath and filtered, after this, the 5 mL distilled water was added in filtrate and shaken for stable froth. The presence of stable froth indicates the presence of saponins.
7. Detection of anthraquinone: This detection test was given by Trease and Evans. According to this method, the sample was taken in a test tube and 0.5 mL of ether was mixed well. Water was added and shaken with a glass rod to detect anthraquinone. Red, pink and violet color shows the presence of anthraquinone.

Physicochemical tests

The following physicochemical tests were done on both samples:

1. Acid value: It was assessed by the titration method, using phenolphthalein indicator solution, ninety-five percent alcohol solution, and standard aqueous potassium hydroxide solution.
2. Specific gravity: It was assessed using pycnometer.
3. Density: It was assessed using Anton Paar density meter.
4. Iodine value: It was assessed by the titration method.
5. Saponification value: It was assessed using the titration method.
6. Refractive index: It was assessed using Abbe refractometer.

High-Performance Liquid Chromatography (HPLC)

HPLC was done for Ricinoleic acid using the system of Shimadzu Prominence.

RESULTS

The findings of phytochemical tests are comparatively summarized in Table 1. The outcomes of physicochemical tests are summarized in Table 2. The percentage of ricinoleic acid in samples S1 and S2 is presented in Table 3. The HPLC chromatogram and corresponding peak table of both samples are shown in Figure 1 and Figure 2.

Table 1: Showing the results of phytochemical screening.

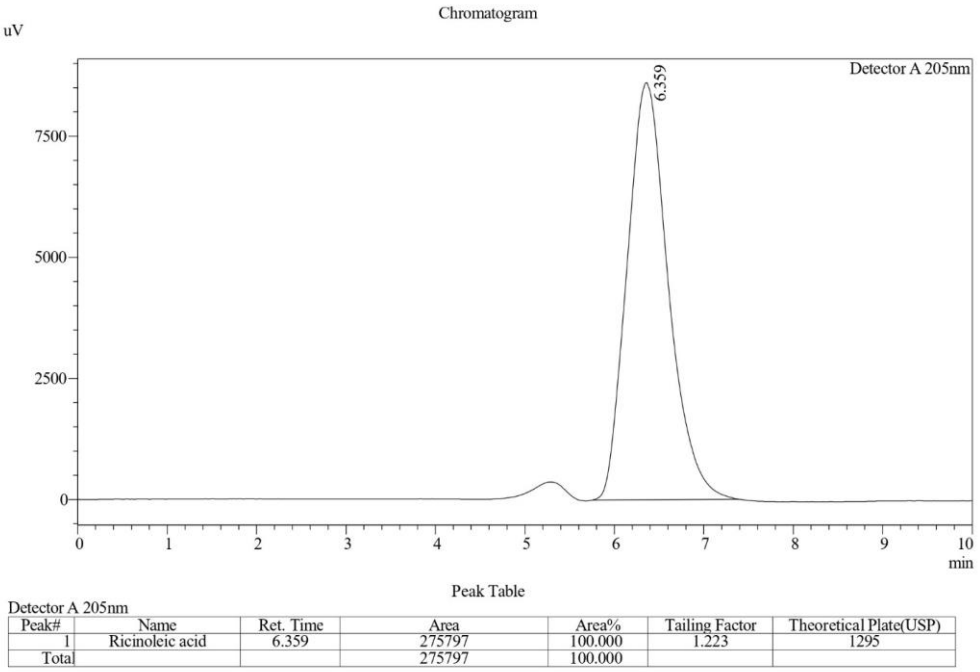
Sl no	Phytoconstituents	Sample S1	Sample S2
1.	Alkaloids	-	-
2.	Glycosides	+	+
3.	Tannins	+	+
4.	Flavonoids	-	-
5.	Steroids	+	+
6.	Saponins	-	-
7.	Anthraquinone	-	-

Table 2: Showing the results of physicochemical tests.

Sl no.	Test parameters	Sample S1	Sample S2
1.	Acid value	29.71mg KOH/g	18.96 mg KOH/g
2.	Specific gravity	0.9680 g/ml at 25^0C	0.9680 g/ml at 25^0C
3.	Density	0.9885 g/cm3	0.9879 g/cm3
4.	Iodine value	88.34 g/100g	83.19 g/100g
5.	Saponification value	162.41mg KOH	124.16 mg KOH
6.	Refractive index	1.4788 nD	1.4770 nD

Table 3: Showing the percentage of ricinoleic acid in both samples.

Sl no.	HPLC	Sample S1	Sample S2
1.	Ricinoleic acid	87.63%	82.71%

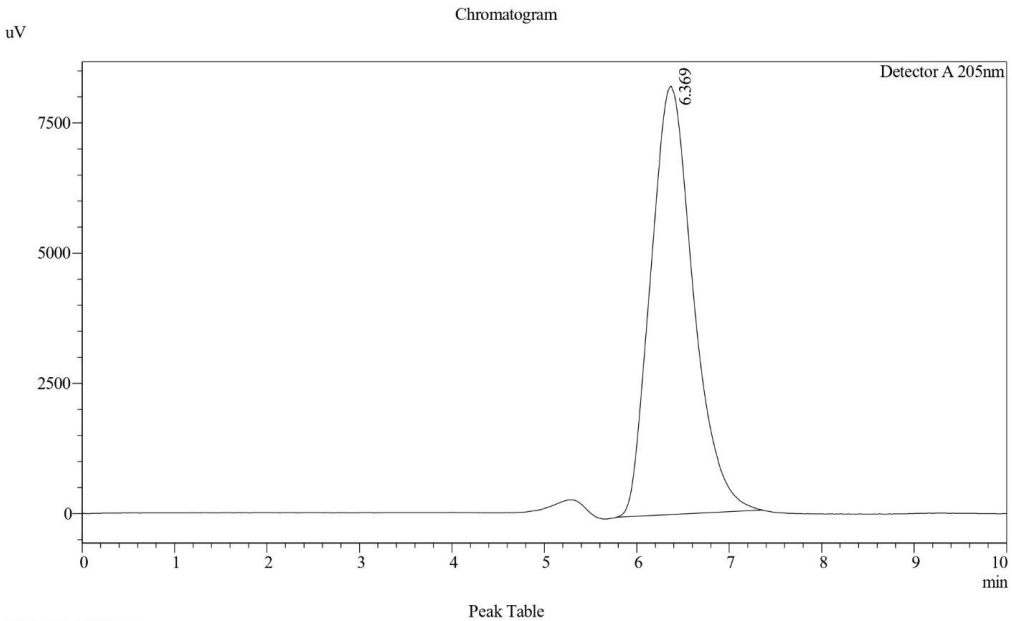


Peak Table

Detector A 205nm

Peak#	Name	Ret. Time	Area	Area%	Tailing Factor	Theoretical Plate(USP)
1	Ricinoleic acid	6.359	275797	100.000	1.223	1295
Total			275797	100.000		

Figure 1: HPLC chromatogram of *Shodhita Eranda Taila.*



Peak Table

Detector A 205nm

Peak#	Name	Ret. Time	Area	Area%	Tailing Factor	Theoretical Plate(USP)
1	Ricinoleic acid	6.369	263225	100.000	1.236	1293
Total			263225	100.000		

Figure 2: HPLC chromatogram of *Ashodhita Eranda Taila.*

DISCUSSION

The present study was undertaken to compare the physicochemical and phytochemical profiles of *Shodhita* and *Ashodhita Eranda Taila* in order to scientifically validate the effect of *Shodhana*. The results obtained provide important insights into the changes brought about by the purification process.

Shodhita Eranda Taila was found to have greater acid value as compared to *Ashodhita Eranda Taila*. A higher acid value in oils indicates a higher level of free fatty acids, which can contribute to rancidity. Coconut water contains natural enzymes, which might interact with the lipases present in the castor seeds. These enzymes can catalyze the hydrolysis of triglycerides, leading to an increased release of free fatty acids, thereby raising the acid value.

In addition, *Shodhita Eranda Taila* was found to have greater iodine value. The more iodine is attached, the higher is the iodine value, and the more reactive, less stable, softer, and more susceptible to oxidation and rancidification of the oil. The bioactive compounds in coconut water, such as phenolic acids and antioxidants, might help preserve unsaturated fatty acids by protecting them from oxidation during the heating process. This preservation would result in a higher iodine value due to the greater presence of double bonds in unsaturated fats.

Saponification value is defined as the number of milligrams of potassium hydroxide required to neutralize the fatty acids within 1 gram of the oil sample. The increased saponification value of *Shodhita Eranda Taila* suggests that the *Shodhana* process likely led to the breakdown of larger triglycerides into smaller ones, resulting in a higher proportion of short-chain fatty acids that require more KOH for saponification. This suggests that the oil could be absorbed more easily, enhancing its efficacy for both topical and oral therapeutic uses.

Based on the results of preliminary phytochemical screening, the presence of glycosides, tannins, and steroids in both samples suggests that the phytochemical constituents are stable and not significantly degraded or removed by the *Shodhana* process. However, quantitative analysis of these components might shed light on the quantitative effect of *Shodhana* on phytoconstituents.

Ricinoleic acid is the main component present in castor oil. In the intestines, castor oil undergoes enzymatic breakdown by lipase, resulting in the formation of ricinoleic acid. This compound then triggers the activation of EP3 and EP4 prostanoid receptors found in smooth

muscle cells. This receptor activation initiates a temporary increase in calcium levels, leading to enhanced intestinal motility. Castor oil is classified as a stimulant laxative based on this mechanism of action. [11]

The HPLC analysis revealed a higher quantity of ricinoleic acid in *Shodhita Eranda Taila* compared to *Ashodhita Eranda Taila*. Ricinoleic acid, besides its role in inducing a strong laxative effect, is known for its anti-inflammatory, antimicrobial, and moisturizing properties. Given these additional functions of ricinoleic acid, the increased concentration of this compound in *Shodhita Eranda Taila* suggests potential benefits beyond its laxative action, including enhanced therapeutic effects in various applications.

CONCLUSION

This study comprehensively evaluated the phytochemical profile, physicochemical properties, and HPLC of *Eranda Taila* extracted from *Shodhita* and *Ashodhita Eranda beeja*. The physicochemical tests and HPLC revealed the enhanced therapeutic benefits of *Shodhita Eranda Taila*, indicating its better absorption and increased efficacy due to higher quantity of ricinoleic acid. These findings validate the traditional Ayurvedic *Shodhana* process, demonstrating its positive impact on the quality and therapeutic potential of *Eranda Taila*. This research bridges traditional methods with modern scientific standards and paves the way for future studies to explore the broader phytochemical profile, experimental studies, and clinical applications of *Shodhita Eranda Taila*. This would support the integration into contemporary healthcare practices. Although the process of *Shodhana* might seem tedious and time-consuming, shastras have prescribed this procedure for a reason. This study, employing modern scientific methods, has proven the enhanced therapeutic efficacy of *Shodhita Eranda Taila*. Despite its laborious nature, *Shodhana* is essential for achieving better therapeutic effects.

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