

**A PHARMACEUTICO-ANALYTICAL STUDY AND STANDARDIZATION OF *KARANJ*
(*PONGAMIA GLABRA LINN.*) TAILA****Dr. Mohammad Faheem***P.G. Scholar in the Department of *Rasashastra*, at DBACH, Mandi Gobindgarh, Punjab.***Corresponding Author: Dr. Mohammad Faheem**P.G. Scholar in the Department of *Rasashastra*, at DBACH, Mandi Gobindgarh, Punjab.

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ABSTRACT

Karanj is very common plant found almost in every part of India. It is having many properties. It is mentioned in *Aragvadhadi*, *Varunadi* & *Arkadi Dravya* of *Astang Hridayam*. We made oil of seeds of *Karanj* (*Pongamia glabra* Linn.) and measure its efficacy on the basis of *Ayurvedic* standardization as well as modern principles. Here in this research work we reviewed about the properties of *Karanj* and performed analytical analysis of *Karanj* seed oil. This research work opens the doors for further clinical research on the basis of properties of *Karanj*.

INTRODUCTION

Karanj (*Pongamia glabra* Linn.) a well known drug mentioned in almost all the *Ayurvedic* classical texts basically used for skin related problems. It is mentioned in *Aragvadhadi*,^[1] *Varunadi*,^[2] & *Arkadi*,^[3] *Dravya* of *Astang Hridayam*. We made oil of seeds of *Karanj* (*Pongamia glabra* Linn.) and measure its efficacy on the basis of *Ayurvedic* standardization as well as modern principles.

Need of Study

There is a formulation known as *Karanjadi Taila*,^[4] which contains drugs like *Karanj* (*Pongamia pinnata* (*Pongamia glabra* Linn.)), *Saptachada* (*Alstonia Scholaris*), *Langali* (*Gloriosa superba*), *Snuhi* (*Euphorbia nerifolia*), *Arka* (*Calotropis procera*), *Anala* (*Plumbago zeylanica*), *Bhringraja* (*Eclipta alba*), *Nisha* (*Curcuma longa*), *Goumutra* (*Aqua omnium florum*), *Visha* (*Aconitum ferox*) & *Tila Taila* (*Sesamum indicum*), many of them are *Visha* and hard to get. But the formulation of *Karanjadi Oil* performing almost same function as such *Karanj Taila* (*Pongamia glabra* Linn.) like wound healing and helps in skin related disorders as mentioned in *Ayurvedic* classical texts. Present study help in conclusion of efficacy of *Karanj Taila* (*Pongamia glabra* Linn.) by knowing its Pharmaceutical properties and by the process of standardization proper analysis of *Karanj Taila* (*Pongamia glabra* Linn.) will be done. So we could use *Karanj Taila* (*Pongamia glabra* Linn.) in these problems freely.

Previous Work Done

- By Rukhsar Alam, Studies on the properties of *Karanj Oil* for probable industrial application, Department of Chemistry, National Institute of Technology, Rourkela.^[5]

- An experimental investigation of *Karanj* biodiesel production in Sarawak, Malaysia.^[6]
- Prospect of *Pongamia pinnata* (*Karanj*) in Bangladesh: A sustainable source of liquid fuel.^[7]
- Potential of herbs in skin protection from ultraviolet radiation.^[8]
- Viscous flow behavior of *Karanja* oil based bio-lubricant base oil.^[9]
- Gastroprotective properties of *Karanjin* from *Karanja* (*Pongamia pinnata*) seeds; Role as antioxidant and H⁺, K⁺, -ATPase inhibitor.^[10]
- Production of Bio Diesel from High free fatty acid *Karanja* (*Pongamia pinnata*) oil.^[11]

Objectives of Study

- To prepare *Karanj Taila*.
- To do pharmaceutico-analysis of *Karanj Taila*.
- To do standardization of *Karanj Taila*.
- To develop standard product as per classical and modern parameters.

Scope of The Study

The results of this study will be helpful for the comparative studies of *Karanjadi Taila* and *Karanj Taila*, Experimental study on *Karanj Taila*, Comparative Clinical Study of *Karanjadi Taila* and *Karanj Taila* in many diseased conditions.

Research Hypothesis

H0 – To prepare and study pharmaceutico-analytical and standardization of *Karanj Taila*.

H1 – Prove the standardization of *Karanj Taila*.

Research Methodology

The present research work has been divided into the following steps

Literary Study

- Drug review
- Pharmaceutical review

MATERIAL AND METHODS❖ **Pharmaceutical study**

- Procurement
- Identification & Authentication
- Foreign matter

❖ **Method of preparation**

- Preparation of *Karanj Taila* will be done as per classical texts.

❖ **Analytical study**

- Pharmaceutico-analytical and standardization of prepared *Karanj Taila* will be done.

❖ **Review literature**

- The literature of the *Karanj Taila* will be compiled from different authentic texts.

❖ **Drug review**

- The literature of the *Karanj* will be compiled from different authentic texts

❖ **Pharmaceutical study**

- Procurement of raw materials.
- Identification of various ingredients.
- Preparation of *Karanj Taila*.
- Observation during the preparation of *Karanj Taila* will be illustrated.

Analytical study

For the Pharmaceutico-analytical and standardization of prepared *Karanj Taila* various tests will be carried out which are given below

❖ **Physical properties of *Karanj Taila***

- Color
- Nature

❖ **Chemical properties of *Karanj Taila***

- Assay of *Karanj Taila* after preparation.

❖ **Method of Pharmaceutico-Analysis of *Karanj Taila***

- Physical appearance inspection
- Moisture content of oil
- Specific Gravity

Analysis of *Karanj Taila***1. Organoleptic Analysis****Table 1: Results of Organoleptic study.**

S. No	Organoleptic characters	Observation
1.	Colour	Yellowish-Brownish
2.	Odour	Pungent
3.	Appearance	Thick
4.	Touch	Thick & Non-Sticky

- Refractive index
- Spread ability
- Iodine value
- Acid value
- PH value
- Saponification value etc.

OBSERVATIONS AND RESULTS

The inference will be made on the basis of Pharmaceutico-analytical and standardization of prepared *Karanj Taila*.

Discussion

Obtained results will be discussed based on Ayurvedic concepts and modern scientific parameters.

Summary & conclusion

The whole research work will be summarized and the conclusion of this research work will be made based on obtained data.

Research Design

It is a pharmaceutico-analytical and standardization study of *Karanj Taila*.

Research Setting

Authentication of raw drug will be done from Quality control laboratory of Desh Bhagat University, Mandi Gobindgarh, and Punjab.

Final Drug

- Preparation of *Karanj Taila* will be done at DBU's P.G. school of Ayurveda.
- Pharmaceutico-analytical and standardization of prepared oil will be done from Quality control laboratory of Desh Bhagat University, Mandi Gobindgarh, and Punjab.

Expected Outcome

- A Standardized *Karanj Taila* will be prepared which the drug of choice for many disorders.
- *Karanj Taila* will be used as substitute of *Karanjadi* and *Jatyadi Taila*.

2. Physio- Chemical Analysis

Table 2: Showing Physio- Chemical Analysis of *Karanj Taila*.

S. No	Test	Values
1.	Refractive index	1.47
2.	Acid value	0.44
5.	Iodine value	89.95
6.	Saponification value	192.43
7.	Viscosity	3.850
8.	pH	3.98
9.	Specific Gravity	0.8355

3. Heavy metals test

Table 3: Showing Heavy metals test result of *Karanj Taila*.

S. No	Name of Test	<i>Karanj Taila</i>	Limits
1.	Lead	0.65 ppm	NMT- 10 ppm
2.	Arsenic	< 0.5 ppm	NMT- 3 ppm
3.	Cadmium	< 0.01 ppm	NMT- 0.3 ppm
4.	Mercury	< 0.13 ppm	NMT- 1 ppm

4. Aflatoxins test

Table 4: showing Aflatoxins test result of *Karanj Taila*.

S. No	Name of Test	<i>Karanj Taila</i>	Limits
1.	B1	Absent	NMT- 0.5 ppm
2.	B2	Absent	NMT- 0.1 ppm
3.	G1	Absent	NMT- 0.5 ppm
4.	G2	Absent	NMT- 0.1 ppm

DISCUSSION

The work will said to be fruitful only when the experimentally obtained results have been interpreted based on the compiled literature and thereby discussing in length and breadth to draw logical conclusions. *Acharya Charak* already said in *Viman Sthana* that “any research work without being discussed about its nature, utility and importance is said to be incomplete, any hypothesis becomes principle only after discussed from all the angles.

The discussion of the study may be divided into following point-

- Discussion on Drug
- Discussion on Disease
- Discussion on Pharmaceutical Study
- Discussion on Analytical Study
- Discussion on Anti-fungal Analysis

Discussion on Drug

Karanj is well known drug basically used for wound healing and skin related problems and almost explained by every *Nighantukara* in their texts. It is mentioned in both types of *Ayurvedic* texts *Brhtriyi* and *Laghutriyi*. In *Charaka Samhita* of *Acharya Charaka* it is mentioned in *Kandughna & Katukaskanda* while in *Susruta Samhita* of *Acharya Susruta* it is mentioned in *Kaphasamshamana Dravya*. The *Karanj Taila* possess *Ushna Virya*,^[12] and it is a known fact that, drug acts by its *Virya*. *Ushna Virya* is necessary to counteract the

Vata and *Kapha Dosha*, hence this *Taila*¹³ is found effective in the management of skin disorders, wound healing.

There is a lot of work is done on *Karanj (Pongamia glabra* Linn.) basically on its oil. The studies states that *Karanj* seed oil has hair growth benefits,^[14] liquid fuel,^[15] biodiesel,^[16] etc. *Karanj (Pongamia glabra* Linn.) is a medium sized tree which found in all over India and due to its demands and benefits now days it is also being cultivated in the many parts of country. According to *Ayurveda* it helps in wound healing, skin problems etc. *Karanj (Pongamia glabra* Linn.) oil is obtained from its seeds whether by cold pressed method or hot pressed methods. So, whole plant is conserved with the help of these methods. As during hot processing most of the important constituents of oil are getting removed while cold pressed method reserve all the constituents of oil as such.

In the market, one more is available, named *Karanjadi Tailam* which is having more than one ingredient. According to *Sharangdhar Samhita*,^[17] *Karanjadi* oil consist of *Karanj(Pongamia glabra* Linn.), *Jati (Jasminum officinale* Linn.), *Karveer (Nerium indicum* Mill), *Chitraka (Plumbago zeylanica)*, *Til (Sesamum indicum)Taila* and water while in *Bhaishajya Ratanvali*,^[18] *Karanjadi* oil consist of *Karanj (Pongamia pinnata (Pongamia glabra* Linn.)), *Saptachada (Alstonia Scholaris)*, *Langali (Gloriosa superb)*, *Snuhi (Euphorbia nerifolia)*, *Arka (Calotropis procera)*, *Anala (Plumbago*

zeylanica), *Bhringraja* (*Eclipta alba*), *Nisha* (*Curcuma longa*), *Goumutra* (*Aqua omnium florum*), *Visha* (*Aconitum ferox*), *Taila* (*Sesamum indicum*).

The formulation of Sharangdhara Samhita is quite simple with fewer ingredients with more benefits but Bhaishajya Ratanvali formulation consists most of the poisonous drugs. The presence of poisonous drugs suggests about the Shodhana of these drugs before use and also after the oil preparation again Shodhana is required which makes the process lengthy and time consuming. Also most of these drugs are endangered or not exists as such so that their substitutes would be used for the preparation of formulation. So overall it is quite hectic and expensive. But when we make only Karanj (*Pongamia glabra* Linn.) seed oil it is less time consuming and cost effective also. The benefits of both the oils "Karanjadi and Karanj,^[19] (*Pongamia glabra* Linn.) Oil" is almost same both of these oils are used in skin disorders, wound healing, herpes, eczema, hair growth etc.

Discussion on Disease

Karanj (*Pongamia glabra* Linn.) oil for skin disorders as we know or mentioned in *Ayurvedic* classical texts there are seven immediate factors which are responsible for skin disorders. *Acharya Charaka* states that *Vata*, *Pitta*, *Kapha*, *Twak*, *Rakt*, *Mamas* and *Ambu* (*Lasika*) all they are immediate causative factors for skin disorders.^[20]

As *Karanj* (*Pongamia glabra* Linn) is having qualities like *Laghu-Guna*,^[21] properties like *Kapha-Vata-Samaka*,^[22] *Raktprasandana*,^[23] hence it is capable to treat skin disorders with these qualities on the basis of *Ayurvedic* fundamental principles.

As in the healing process of a wound there are certain factors which take part like inflammation, tissue injury, bleeding, pus etc. So for healing of a wound two main factors are required which are Sodhana (making free from undesirable healing factors) and Ropana (closure of wound). *Karanj* (*Pongamia glabra* Linn.) is having *Tikta-Katu-Kasaya-Rasa*,^[24] all three are known as *Sodhaka Rasa* because they have *Agni-Vayu-Jal-Mahabhuta*.^[25] which helps in cleaning or enhance the healing process. Also, *Karanj* (*Pongamia glabra* Linn.) is having *Laghu-Tiktsna-Guna*.^[26] in which *Laghu-Guna*.^[27] helps in reaching the every cell body for nourishing them and *Tiktsna-Guna*.^[28] which is again *Agni-Guna Pradhana*.^[29] help to fight with unwanted bacteria or fungi and protect the wound. These factors make *Karanj* (*Pongamia glabra* Linn.) an ideal drug of choice for Sodhana of a wound. Now for Ropana process *Karanj* is having *Laghu-Guna* which helps in nourishment of cells. *Kasaya-Rasa* of *Karanj* (*Pongamia glabra* Linn.) helps in closure of wound quickly. Also, *Karanj* (*Pongamia glabra* Linn.) having properties like *Sothhara* which helps in treating inflammation of wound, *RaktSodhaka* property of *Karanj* (*Pongamia glabra* Linn.) helps in enhancement of healing process by purifying the blood. Hence with all these factors we can say that *Karanj* (*Pongamia glabra* Linn.)

is ideal for wound healing. As its oil can be used externally so by these qualities it is able to treat a wound. Here we prepare *Karanj* (*Pongamia glabra* Linn.) seed oil by cold pressed method and performed some test on it which suggests that this oil is safe and free from harmful chemicals. The *Karanj* (*Pongamia glabra* Linn.) seed oil is affordable and effective as many theories suggests.

Discussion on Analytical Study

Refractive index

The refractive index is characteristics feature of the fatty materials as well as the formulations containing it. In some conditions, the atmospheric conditions as well as light spectrum have influence on refractive index. It is well known that the refractive index get decreased with the molecular weight of the fatty compounds. It is also related with low iodine value as refractive index decreases with un-saturation. Also, the presence of free fatty acids appreciably lowers the refractive index of an oil or fat. The low refractive index might be related to high proportion of fatty acids. The changes in refractive index values might be related to the chemical changes occurring in samples due to storage conditions of temperature and humidity. The refractive indices are shown in Graphical form below which is approximately same for both samples as 1.47 respectively for *Karanj Taila*.

Acid value determination

The acid number or acid value is a measure for the amount of free fatty acids in the vegetable oil and describes the quantity of caustic potash solution, which is necessary for the neutralization of the free fatty acids. The acid number depends strongly on the refining degree and the aging degree of oil. By water in the oil as well as micro organisms, enzymes and other chemical constituents, a hydrolytic splitting of the triglyceride can occur and lead to a rise of the acid number. Acid number and oxidation stability is characteristic values for the ageing of fatty material and oils used in different industries. They describe however different procedures in the oil, which however partially by the same parameters, as temperature, light, water and storage conditions are affected. A high portion of free fatty acids in the oil possibly leads to a short induction period with the measurement of oxidation stability. Water in the oil is the condition for hydrolytic splitting of triglycerides and thus the occurrence of free fatty acids. The water content and also, the humidity in the environment play an important role in changing the acid value of the fatty materials. The acid values of samples *Karanj Taila* are having 0.44 values respectively.

Iodine value determination

Iodine value is related to the fatty materials in a compound. It is also called Iodine Number and measures the degree of unsaturation of an oil, fat or wax. It is the amount of iodine, in grams, that is taken up by 100 grams of the oil, fat, or wax. Saturated oils, fats, and waxes take up no iodine; therefore their iodine value is

zero; but unsaturated oils, fats, and waxes take up iodine. Unsaturated compounds contain molecules with double or triple bonds, which are very reactive toward iodine. 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 is the oil, fat, or wax. Drying oils are used in those preparations that have to dry very fast after applying. These oils are used in the paint and varnish industry and have relatively high iodine values (about 190). Semidrying oils, such as soybean oil, have intermediate iodine values (about 130). Nondrying oils, such as olive oil, linseed oil used for soap making and in food products, have relatively low iodine values (about 80). The fatty materials that are solid on 14.5-15.5 °C are considered as fat while those having liquid consistency at this temperature are known as oils. The fatty materials due to very less amount of unsaturation are solid. The location and number of double bonds are important because they influence reactions that can occur to destabilize the fatty acid chain. The interaction of oxygen molecules with the fatty acid chain, called "oxidation" and it is the chemical mechanism that destabilizes oil. After oxidation, hydro peroxides (one hydrogen atom and 2 oxygen atoms) are attached to the fatty acid chain. In food oil, this leads to rancidity. The presence of fatty material in more amounts provides the solid consistency to the fats. However, the availability of many crude drugs affects this consistency of oil preparation due to number of active constituents extracted. The extracted constituents may be alkaloid, terpenoids, flavonoids, glycosides etc. and it depends upon the nature of crude drug as well as extraction ratio. Sometimes, these active concentrations increase as the time for extraction increases. But the changes are very less as the amount of unsaturated fats is very less. A low degree of unsaturation in oil/fat makes it less susceptible

for rancidity. The samples of Karanj Taila were analyzed for Iodine value by Wijs method with 89.95 readings respectively.

Saponification value determination

Saponification value is expressed by potassium hydroxide in mg required to saponify one gram of fat. It indicates the free acidic groups with their types available in the fatty matter. This value is useful for comparative study of the fatty acid chain length in oils. The saponification values of Karanj Taila during analysis were 192.43 respectively.

Viscosity

Viscosity is a property of a liquid, which is closely related to the resistance to flow. The Viscosity values of Karanj Taila during analysis were 3.850 respectively.

Aflatoxins test

Similar observation was also judged for the presence of Aflatoxins. The values reported in analytical findings for B1, B2, G1 and G2 for Karanj Taila was absent respectively. The interpretation of the result is that all samples were explicated analytically for Aflatoxins and are not found which is said to be significant for quality assurance.

Assay of Heavy metals

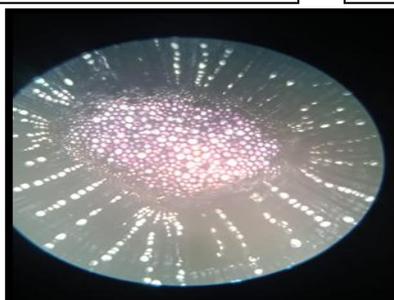
Similar observation was also judged for the presence of heavy metals. The values reported in analytical findings for Pb, As, Cd and Hg for Karanj Taila was 0.65, 0.5, 0.01, 0.13 and 0.24, 0.2, 0.01, 0.07 respectively. The interpretation of the result is that all samples were explicated analytically for heavy metals and are found under permissible limit which is said to be significant for quality assurance.



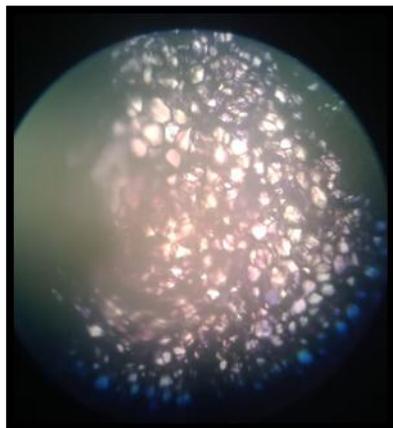
T.S. of Pongamia glabara Linn Stem



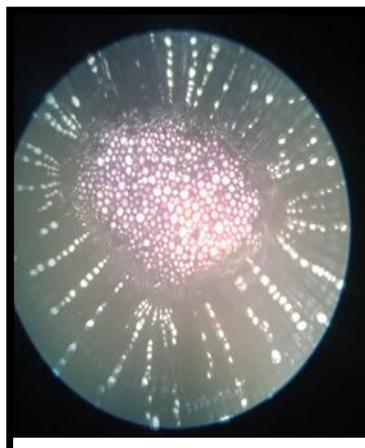
T.S. of Pongamia glabara Linn



T.S. of Pongamia glabara Linn Mid-Rib of Leaf



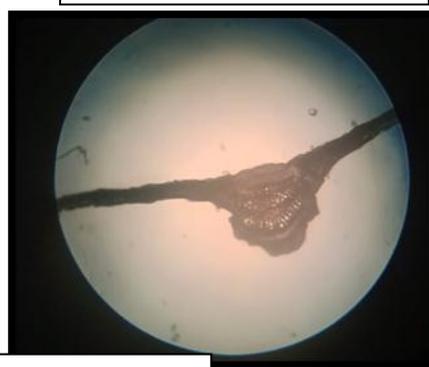
T.S. of *Pongamia glabra* Linn
Stem



T.S. of *Pongamia glabra* Linn
Stem



T.S. of *Pongamia glabra* Linn Mid-Rib
of Leaf



CONCLUSION

The present work research work entitled as “A Pharmaceutico-analytical study and standardization of *Karanj (Pongamia glabra Linn.) Taila*” has been framed to undertake a critical literary, conceptual, pharmaceutical and physico-chemical-analysis of the prepared *Karanj (Pongamia glabra Linn.) Taila*. We find making *Karanj (Pongamia glabra Linn.)* oil from its seeds is quite affordable and effect. *Karanj (Pongamia glabra Linn.)* oil is used in many diseases related to skin problems like herpes, eczema, itching, fungal infections, wound healing, hair growth etc. All the tests performed on the sample of *Karanj* oil shows that it is not harmful at all and can suits maybe on all skin types.

In modern era we have no time for the identification and collection of herbs of making such oils which give wonderful results as like *Karanj (Pongamia glabra Linn.)* oil. The *Karanjadi* oil which we already discussed is having more than one drug in the formulation and most of the ingredients are poisonous in nature and rare to find. The *Karanjadi* oil performs almost same functions as *Karanj (Pongamia glabra Linn.)* seed oil but it is not affordable and cost effective. First of all most of the ingredient of *Karanjadi* oil are poisonous in nature that's why they required purification before use which a time consuming method; secondly after the purification of all the ingredient when oil is prepared, the

purification of oil is also required so it is time consuming and some where costly.

As we know today's is an era of innovation and entrepreneurship so any one starts his/her starts up by making the *Karanj (Pongamia glabra Linn.)* seed oil and marketing it. It is durable, effective and affordable for everyone. We use bitadine, for wound healing and clean the wound with hydrogen peroxide which is quite unsafe and somewhere hurtful to the patient due to their irritant nature. If we use *Karanj (Pongamia glabra Linn.)* oil for wound healing it helps in wound healing as well helps in closure of wound with fewer scars on skin due its *Sodhana* and *Ropana* properties.

The current research project is not only about to prove the standardization of *Karanj (Pongamia glabra Linn.)* oil but also about the importance of *Karanj (Pongamia glabra Linn.)* oil. By this study we can suggest that further studies related to *Karanj (Pongamia glabra Linn.)* must be done by future scholar for the betterment of society and *Ayurveda*. We have a lot of drugs and drug formulation written in *Ayurvedic* classical texts but very less is proved on the basis of modern parameters. Because we are *Ayurvedacharya's* it's our duty to prove our treasure give a better environment and choice of treatment to the society.

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