PHARMACOGNOSTIC STUDIES ON THE FRUITS OF
JATROPHA CURCAS LINN

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ABSTRACT: Present paper deals with the pharmacognostic studies of the fruits of J. curcas Linn. The 75-80 cells thick pericarp is differentiated into epicarp, mesocarp and endocarp. Mesocarpic zone embeds non-articulated laticifers, tannin containing idioblasts and randomly distributed vascular bundles. Endocarp shows the occurrence of fibrous sclereids. Preliminary phytochemical screening of the drug powder shows the presence of alkaloids, carbohydrates, glycosides and tannins. Clinical evaluation of the fresh fruit juice has shown its anti gingivitic property.

INTRODUCTION

Jatropha curcas Linn. is a known medicinal plant in traditional system of medicine 1-5. All the parts of the plant are credited with medicinal properties. The juice of the plant is well known as a purgative, Oil from the seeds is depurative and antiseptic; considered to be useful in scabies, eczema and ringworm diseases and as a cleaning application for wounds, sores and ulcers.

Leaves are rubefacient and lactogogue. The juice of the leaves is applied externally for piles. Stem juice is haemostatic and styptic. Root bark is stomachic and astringent. Twigs are used as a toothbrush for swollen gums.

Fruits are considered to be acrid, irritant and purgative. Latex is applied topically to wasp and bee stings and is also applied to decayed teeth, wounds and used as a styptic. Milky sap of J. curcas was clinically evaluated in the treatment of common warts and fond positive results6.

Few handful workers have isolated some of chemical constitutes from the plant7,8. Vitexin, isovitexin, composterol and 1-triacentanol was isolated from leaves. Palmitic, oleic and linoleic acid was determined in seed fat. Two new flavonoid glycosides I and II along with stigma sterol and β – sitosterol were isolated from leaves. A complex of 5- hydroxypyrrolidin-2-one and pyrimidine -2,4-dione was also isolated from the leaves. Even though the fruits are having medicinal value, no attempt has been made so far to study the fruits of J. curcas. Hence it is though worth investigating the fruits of this plant to fill that lacuna in our knowledge. Present paper deals with the morphological, microscopical, preliminary phytochemical screening and clinical investigation of the fruits of J.cruicas.

MATERIALS AND METHODS

The fruits of J. curcas were collected from the Botanical garden, Sardar Patel University. Some of the fruits were fixed in FAA9, few of them were crushed and the juice was extracted, while the remaining were air dried for powder analysis. Epidermal peelings were obtained either by
scraping of the outer surface of the epicarp or boiling the fruits with distilled water or treating the fruits with 60% nitric acid. Peelings were stained with Delafield’s Haematoxilin. To study the anatomical details of the pericarp customary methods were followed for dehydration, infiltration and embedding. Sections were cut at 8 to 10µm thickness and stained with safranin and fast green combination. Histochemical tests such as calcium oxalate crystals, tannins, starch, lignins and proteins were carried out. The shade-dried material was powdered, which was used for the Microcopical and preliminary phytochemical tests. Standard procedure was followed for estimation of ash values, extractive values and fluorescence analysis. Fresh pericarp in 200g quantities was crushed in a mixer and filtered through fine cheesecloth. This juice was used for the clinical studies.

RESULTS AND DISCUSSION

Macroscopy: Fruits are capsules, 4-8 cm in diameter which appear circular to ovoid in shape; look green in colour at initial stage, but turn pale yellow to yellow at maturity, later become brownish black. Dehiscence is of loculicidal.

Microscopy (Fig.11): Pericarp is 75 to 80 cell layer thick and is differentiated into outer epicarp, middle mesocarp and inner endocarp. Epicarp is two or three-layered thick. It is composed of tangentially elongated parenchyma cells with moderately thick walls. Outer tangential walls of the outer epicarp is cells are covered with thick cuticle. In surface view (Fig.4), epicarpic cells appear polygonal in shape with a smooth cuticle; three to four epidermal cells surround the guard cells (anomocytic type of stomata). Stomatal frequency is found to be low. The parenchymatous mesocarp is 60 to 65 cells thick. Non–articulated anastomosing laticifers, tannin content and vascular bundles are randomly distributed in the mesocarp. Cells in the outer and inner peripheral layers of mesocarp appear smaller with scanty cytoplasm while the vacuolated cells of middle layer appear larger. Radially elongated cells in six to ten rows a wedge shaped zone in the median portion of each carpe, which represents the future dehiscence zone (Fig.1). The fibrous endocarp (Fig.2) is eight to ten layers thick. First two or three layers from the periphery are composed of isodiametric cells, while the other endocarpic layers possess tangentially elongated cells. The peripheral layer of the septum (Fig 3) on either side resembles the endocarp, while the cells situated in the middle layers of septum appear similar to that of mesocarp. A large well-developed crescent shaped vascular bundle is embedded in the ventral side of each septum. Calcium oxalate crystals are found to be absent.

Powder analysis: Epicarp is composed of a layer of thin walled cells, polygonal in surface view with a smooth cuticle; stomata are of anomocytic type. Endocarp is composed of a layer fairly large cells with thin, slightly lignified walls, In surface view the cells are considerably elongated and lie with their long axis parallel to one another (Fig.5) Sclereids, which show great variation in size are some time very large. Some of the larger sclereids are much elongated and developed as fibro sclereids with the ends.

Some times markedly tapered: the walls are moderately or some times unevenly thickened, having thinner at the tapered ends. Numerous pits are present and these are frequently branched (Fig:6&7). Vessels are lignified, fairly large in number, possessing small pits, Perforation plates are
found either at one end or at the both ends (Fig:8). The cell walls of the fairly abundant fibres are thickened fibres are thickened and lignified or only moderately thickened and slightly lignified (Fig 9). Laticiferis are long, non-articulated and un branches (Fig.10).

Ash values are tabulated in Table No.1. Extractive values are given in the Table No.2. While the fluorescence analysis and chemical tests are given in Table No.3&4 respectively.

Preliminary clinical studies: Experiment was carried out on 12 human volunteers who were suffering with gingivitis. About 20 ml of juice obtained from the fresh fruits was applied on the effected parts of the gums for half an hour period per day. This kind of treatment was given for 15 days. Along with the fruit juice some Naturopathy treatments were also administered. Constant progressive results were obtained. Bleeding from the gums completely stopped after the sixth day of treatment. Swelling of gums was greatly reduced after fifteenth day. Redness occurred due to the infection at the effected sites of gums and bad odour from the mouth was stopped at the end of treatment period. Routine programme is given in table No 5.

A perusal of literature reveals that except the fruit the botanical aspects of all other parts of J.curcas has been studies in detail 1** Epidermal structural studies reveal the occurrence of anomocytic type of stomata. It is interesting to note that the other parts of the plant exhibit paracytic type of stomata14.

Fresh fruit juice along with some Naturopathy treatments when tried in combination gave very good results with in fifteen days. Constant progressive improvement was shown during the period of treatment to all the patients, However it is a preliminary study, before coming to any conclusion it is necessary to carry out the clinical studies in detail.

REFERENCES

1. Anonymous., Pharmacognosy of Indian Drugs Vol.I. Central Council of Research in Ayurveda and Siddha, New Delhi, 262-291 (1982).

2. Anonymous., Medicinal Plants of India, Vol.2. Indian Council of Medical Research New Delhi, : 101-102 (1987)

3. Anonymous., The treatise on Indian Medicinal Plants, Vol 3. Publication and Information Directorate (CSIR), New Delhi, : 42-43(1994).

4. Anonymous., India Medicinal Plants, Vol.3 Arya Vaidyasala, Kottakal, Kerala,: 261-263 (1995)

5. Kirtikar, K.R. and Basu, B.S. Indian Medicinal Plants , Sec. Ed., Lalit Mohan Basu, Allahabad, India, : 2244-2246 (1988)

6. Marroquin, E.A., Blanco, J.A., Granados, S., Caceres, A. and Morales, C., Clinical trial of jatropha curcas sap in the treatment of common warts. Fitoterapia., 68(2): 160-162 (1997).
7. Rastogi, R.P. and Mehrotra, B.N., Compendium of Indian Medicinal Plants, Vol 2.CDRI, Lucknow and Publication and information Directorate (CSIR, new Delhi,: 397 (1993)

8. Satubmann, R., Schubert –Zsilavecz, M., Hiermann, A. and Kartrug, T., A Complex of 5-hydroxypyrrolidin-2-one and pyrimidine-2,4-dion isolated from Jatropha curcas. Phytochemistry, 50 (2): 337-338 (1940).

9. Johansen, D.A. Plant Micro techniques, Sec. Ed., Tata Mc Graw hill publishing company, Bombay, (1940)

10. Saus, J.E. Botanical Microtechniques, lowacollege press, Ames, Iowa, (1958).

11. Krishnamurthy K.V. Methods in plant Histochemistry. Viswanathan pub. Madras (1988)

12. Anonymous. Ayurvedic Pharmacopeia. Min-health & F&W., Govt. Of India,: 143(1989).

13. Chase, C.R. and Pratt, R.J. Fluorescence analysis of powdered vegetable drugs with particular reference to development system of identification. Jr. Amer. Pharm. Asso. (Scied.) 38,324 (1949)

14. Joseph. G.V.R. Histo Morphological and pharmacognostic studies in some euphorbiaceae., Thesis submitted to sardar Patel University, V.V.Nagar, Gujarat., (1996).

Table 1: Ash values:

| Sr.No | Parameter Description | Observations  |
|-------|-----------------------|--------------|
| 1.    | % ash value           | 10.29%       |
| 2.    | % acid insoluble ash  | 0.38%        |
| 3.    | % sulphated ash       | 12.7%        |

Table 2: Extractive values:

| Sr.No | Parameter Description | Observations  |
|-------|-----------------------|--------------|
| 1.    | % alcohol extract     | 2.1%         |
| 2.    | % Water extract       | 15.6%        |

Table 3: Fluorescence Analysis:

| Sr.No | Treatment Description       | Ordinary light | UV Light   |
|-------|----------------------------|----------------|------------|
| 1.    | Drug Powder (D.P) as such  | Greyish brown  | No Change  |
| 2.    | D.P+ aq. 1N NaOH            | Dark Brown     | No Change  |
| 3.    | D.P+ alco 1N NaOH           | Light Yellow   | Blue       |
| 4.    | D.P+ 1N HCl                 | Orange         | No Change  |
| 5.    | D.P+ 50% H2**SO4**          | Black          | No Change  |
Table 4: Chemical Tests:

| Sr.No | Text            | Result |
|-------|-----------------|--------|
| 1.    | Cumarin Test    | Absent |
| 2.    | Carbohydrate    | Present|
| 3.    | Glycoside       | Absent |
| 4.    | Flavonoids      | Present|
| 5.    | Tannin          | Present|
| 6.    | Saponin         | Absent |
| 7.    | Alkaloids       | Present|

Table 5:

Antigingivitic activity of J. curcas on human volunteers

| Time            | Treatment of diet                                                                 |
|-----------------|-----------------------------------------------------------------------------------|
| 1st-5th Day     |                                                                                   |
| 6 A.M.          | Two glasses of (250ml) of cold water.                                             |
| 7 A.M.          | Fresh J.curcas fruit juice for slight gurgling.                                   |
| 7.30 A.M.       | Neutral hip bath for 15 min                                                       |
| 8 A.M.          | Enema or colon irrigation                                                         |
| 11 A.M.         | Any seasonal fruits                                                               |
| 2 P.M.          | Coconut water or Tulsi leaf juice (alternate days)                                 |
| 3 P.M.          | Cold hip bath for 15 min.                                                         |
| 6 P.M.          | Same as at 11 A.M.                                                                |

6th – 10th Day

6 A.M. / 7 A.M. / 7.30 A.M/ 8 A.M. / 3 P.M/ Same as above

11 A.M. : Salad + sprouted pulses + any seasonal fruits

2 P.M : Same as at & A.M. o Tulsi leaf juice with honey (alternate days)

6.30 P.M : Same as at 11 A.M

9 P.M. : Same as at 11 A.M

11th -15th Day

6 A.M. / 7 A.M. / 8 A.M. / 2 P.M/ 3 P.M/ Same as above

11 A.M : Boiled Vegetables + Salad + sprouted pulses + seasonal fruits

6 A.M : Same as at 11 A.M

N.B.

1. After 12 days volunteers can come to normal diet
2. Avoid tea, Coffee. Bread, biscuits, spices during the treatment period.
3. Volunteers should take 8 to 10 glasses of water daily.
4. Fruits can be given whenever they feel hungry.
Illustrations to figures:

Dz: Dehiscent zone  En: Endocarp  Ep: Epicarp
La: Laticifers  Lo: Locule  Me: Mesocarp
Se: Septum  Ta: Tannin  Vb: Vascular bundle

Fig.1  Outer portion of pericarp in T.S. Showing dehiscence zone (at arrows) 50X
Fig.2  Inner portion of the pericarp in T.S. 50X
Fig.3  Septum in T.S. 50X
Fig.4  Epicarp in surface view 350X
Fig.5  Endocarp in surface view 120X
Fig.6  Sclereid 350X
Fig.7  Fibrous sclereids 350X
Fig.8  Vessels 350X
Fig.9  Fibers 350X
Fig.10  Laticifers 350X
Fig.11  Schematic diagram of the fruit in T.S.
