Synopsis of the Thesis Entitled

Pharmacognostic studies on Punarnava
(Boerhaavia and Trianthema) species

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In

Botany

To

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By

Shri ANIL VISHNU DUSANE

Under the Guidance of

Dr. M.S. Kumbhojkar
M.Sc., Ph.D.

And

Dr. A.M. Mujumdar
M.Sc., Ph.D.

At the
Agharkar Research Institute
G.G. Agarkar Road
Pune- 411 004.
India.

Introduction:

It is observed that many times in commerce authentic drugs are adulterated or entirely replaced by cheap and substandard material. Many drugs are sold under the same name and sometimes the same drug is sold under various names (Handa et al., 1951). In some cases there is controversy regarding the identity and efficacy of the crude drugs.

‘Punarnava’ is an important drug used in Ayurveda, Siddha and Unani systems. It has been employed commonly since ancient period by native population as folk medicine for various ailments. Various therapeutic properties have been attributed to Punarnava (Kirtikar and Basu 1933; Datta and Mukherji, 1950, 1952; Nadkarni, 1954; Mudgal, 1975; Chakraborti and Handa, 1989; Guha Bakshi et al., 1999). Literature survey has shown that Punarnava species are used as laxative, anti-pyretic, stomachic, cardiotonic, expectorant, hypotensive, diuretic, anti-bacterial, anti-inflammatory, kidney stimulant and used for asthma, jaundice, eye diseases, urine complaints, menstrual cramps etc.

In pharmaceutical industries Punarnava is used in 52 products (Tiwari et al., 1998). It is a chief ingredient in the several Ayurvedic formulations like Punarnavasam, Kumarusavam, Dhanvantaram kalambu, Chyavanaprasam, Vastyamayantaka ghrtam, etc.

Unfortunately, there is difference of opinion among Ayurvedic physicians regarding identification, use and potency of two varieties of ‘Punarnava’ viz. Rakta Punarnava (red) and ‘Shwet Punarnava’ (white). The Rakta Punarnava is equated with *Boerhaavia diffusa* L. (Nyctaginaceae), while ‘Shwet Punarnava’ is equated with *Trianthema portulacastrum* L. (Aizoaceae). Some research workers consider *B. erecta* as ‘Shwet Punarnava’ as it possesses white flowers. The different plant species viz. *Boerhaavia diffusa* L., *B. erecta* L., *B. repanda* Willd. and *Trianthema portulacastrum* L. have been equated with Punarnava.

Majority of Punarnava species are occurring as weeds and have potential to become a cheap source of medicine, it was felt necessary to carry out comparative studies regarding identity of Punarnava species and efficacy of various species by studying detailed morphological, anatomical, pharmacognostical, phytochemical and chromatographic studies along with biological studies using animal systems.
The objectives of the present work were,

- To collect Punarnava species viz. *Boerhaavia diffusa* L., *B. erecta* L., *B. repanda* Willd. and *Trianthema portulacastrum* L. from different localities in and around Pune and also from other districts of Maharashtra.
- To compare different Punarnava species by taxonomical, anatomical, and pharmacognostic investigations to evolve the pharmacognostic standards for all four species.
- To carry out Chromatographic studies viz. Thin Layer Chromatography (TLC) and High Performance Thin Layer Chromatography (HPTLC) after solvent extraction.
- To extract, purify and characterize an active ingredient Punarnavoside.
- To study anti-inflammatory (local and systemic) using animal systems.
- To study *in vitro* anti-fungal activity of various extracts.

The present thesis is divided into four chapters.

Chapter-I Introduction: It deals with the importance of authentic herbal medicines and also problems involved in herbal drug industry. In spite of great demand for these products, little research work has been done towards the standardization of single herbal drug or their compound formulations. This is an important part of good manufacturing practices. Considering the importance of above fact, it was felt necessary to carry out studies using multidisciplinary approach to evolve standards of various Punarnava species. The main objectives of the present investigations have been outlined at the end.

Chapter-II Review of literature: The detailed review of ancient literature, distribution, taxonomy, anatomy, phyto-chemistry and seasonal variation studies of 'Punarnava' species have been presented in this chapter. Ethnobotanical information and specific uses in various systems along with biological activities have been reviewed.
Chapter -III Materials, methods and results:

This chapter has been Subdivided in to A) Botanical investigation B) Chemical investigations and C) Biological investigations.

A) Botanical investigations: They deals with collection and processing of various Punarnava species. Comparative taxonomical, anatomical and histo-chemical studies, quantitative microscopy, powder analysis and fluorescence analysis of collected material was carried out. It was observed that fruits, starch grains, calcium oxalate crystals and pollens serve as diagnostic features. The elemental analysis, quantitative microscopy and fluorescence analysis showed significant differentiation in all four Punarnava species. So also histochemical studies showed difference with reference to tannins, flavonoids, saponins and phytosterols.

B) Chemical investigations: They includes proximate analysis, extractive values, micro-chemical test and chromatographic (TLC, HPTLC and Column) studies. Isolation and identification of Punarnavoside from roots of B. diffusa L. was carried out. Comparative total, water insoluble and acid insoluble ash values were carried out for four species. An attempt was made to use TLC pattern of various extracts as an diagnostic character.

C) Biological investigations: The anti-inflammatory activity of all four Punarnava species was evaluated by using local and systemic animal models employing mice and rat systems respectively. Statistical analysis of results was also carried out. The alcoholic extract of all four species showed anti-inflammatory activity in carrageenan and Tridecanoyl Phorbol Acetate (TPA) model. However, it was highly significant with alcoholic extract of B. diffusa L.

*In vitro* anti-fungal activity was evaluated by spore germination method. The anti-fungal activity was evaluated by calculating mean % of spore germination and standard error of mean to assess potency of various extracts. Out of various treatments, significant anti-fungal activity was recorded in 0.5% water extract of B. erecta L. with *Fusarium moniliform* Scheld.
Chapter IV- Discussion: The significance of comparative results obtained using botanical, chemical and biological investigations has been discussed.

Summary and conclusion: Important findings have been highlighted.

References: The references cited in different chapters are appended here.

References:


