Chapter 14

Conclusion
**Meyna laxiflora** is small or medium size tree distributed all over the Satpuda region having significant ethno-medicinal importance in treatment of various diseases like kidney stone, abdominal distention, dysentery, throat infection, helmenthiasis etc but no exhaustive data is available on standardization, identification, phytochemical and pharmacological efficacy of plant. Hence, the plant was subjected for an exhaustive pharmacognostic, phytochemical and pharmacological with aim to determine standardization and safety parameter along with pharmacological properties.

**Collection and authentication of plant**

The plant was authenticated by Dr. M. B. Patil, HOD, Department of Botany, J.E.S. Arts, Science and Commerce College, Nandurbar by comparing morphological features and a sample voucher specimen of plant was deposited for future reference (Voucher specimen number QMA-01).

**Ethno-medicinal status**

The ethnomedicinal survey carried out in tribes of Satpuda hills of Akkalkuwa Taluka (Sakliumar, Aatyabari, Umlipada, Molgi, Dab, Devgoi, Amlibari, Gangapur) reveals that tribes of Satpuda hills from various villages are using plant for treatment of inflammation, gastrointestinal disorder, kidney stone etc. and also used as food material. The knowledge received from them will be very useful in further research.

**Pharmacognosy**

The pharmacognostic parameter such as macroscopy, microscopy, quantitative microscopy and physical parameter of all parts of plant (leaf, stem, bark, root, and fruit) gives significant data which will beneficial in botanical identification.
Phytochemistry

The qualitative phytochemical analysis reveals maximum phytoconstituents such as carbohydrates, proteins, amino acids, glycosides, tannins, saponins and alkaloids are available in all parts of plant. Findings of quantitative phytochemical analysis show that leaf having highest concentration saponins, flavonoids, tannins and phenolic compounds which will help for further pharmacological evaluation.

Leaves were selected for further study on the basis of ethno-medicinal survey and phytochemical analysis and subjected for extraction by various solvent (petroleum ether, chloroform, methanol, water respectively). Preliminary phytochemical analysis shows petroleum ether extract contain steroids, the chloroform extract contain steroids and alkaloids, the methanolic extract contain saponins, alkaloids, glycosides, flavonoids, tannins, carbohydrates, proteins and aqueous extract contain saponins, glycosides, flavonoids, tannins, carbohydrates and amino acids. Quantitative phytochemical analysis showed aqueous and methanolic extract of leaf contain high concentration of most of phytochemicals.

Pharmacology

The different extracts of Meyna laxiflora leaf (petroleum ether, chloroform, methanolic, and aqueous) were evaluated for antioxidant, anti-inflammatory, antiulcer, and anthelmintic and cytotoxic activity.

Evaluation of antioxidant activity (DPPH, nitric oxide scavenging activity and reducing power assay) reveals that aqueous extract is most potent as compare to other extracts by taking ascorbic acid as standard. The activity may correlate with high concentrations of flavonoids, tannins and phenolic compounds available in aqueous extract.
Anti-inflammatory activity was evaluated at Deshpande Laboratories Pvt. Ltd. Bhopal, with prior permission of CPCSEA/IAEC (DL/MA/ 11/13/102) by formalin and carrageenan induced rat hind paw edema determination which reveals that petroleum ether extract have significant anti-inflammatory activity as compare to other by taking diclofenac as standard. The activity may correlate with high concentrations of steroids in petroleum ether extract.

Antiulcer activity was evaluated at Deshpande Laboratories Pvt. Ltd. Bhopal, with prior permission of CPCSEA/IAEC (DL/MA/ 11/13/102) by using the method of Hara and Okabe reveals that none of extracts showed ulcer protection in rats at different doses (100 mg/kg, 200 mg/kg, 400 mg/kg) except aqueous extract which have considerable ulcer protection at dose of 400 mg/kg by taking cimetidine as standard.

In-vitro cytotoxic activity of different extracts of plant was performed at Deshpande Laboratories, Bhopal, on HT-29 cell line (colorectal adenocarcinoma) obtained from 44 years female by MTT assay using the standard operating procedures. The results of the present study showed that the aqueous extracts of plant have significant in-vitro cytotoxic activity against HT-29 cell line as compare to others by taking doxorubicin as standard. The activity may correlate with high concentrations of flavonoids, tannins and phenolic compounds available in aqueous extract and its antioxidant, anti-inflammatory and antiulcer activity.

The anthelmintic activity was evaluated on adult Indian earthworm (*Pheretima posthuma*) and tapeworm (*Haemonchus contortus*). The results of present study reveal that all extracts (petroleum ether, chloroform, methanolic and aqueous) of *Meyna laxiflora* have anthelmintic activity against both worms which is directly proportional to the concentration. Results also reveals that aqueous extract have
significant anthelmintic activity as compare to other extracts. The activity may correlate with presence of phenolic compounds, flavonoids, tannins and alkaloids compounds which may act separately or jointly.

**Isolation and characterization of possible phytoconstituents**

Pharmacological evaluation suggest that petroleum ether extract shows potent anti-inflammatory activity and aqueous extract shows significant in-vitro antioxidant, cytotoxic activity on HT-29 cells, anthelmintic activity and considerable in vivo anti-ulcer and anti-inflammatory activity. Therefore petroleum ether and aqueous extracts were subjected to column chromatography for separation of possible active phytoconstituents.

Fractions obtained from petroleum ether extract, grouped into two major fractions (A and B) according to their Rf values. After purification and re-crystallization fraction A gives 28 mg, white crystalline powder (PML1) and fraction B gives small quantity of yellowish color powder (PML2). Hence, compound PML1 was identified as Lupeol after characterization by various methods.

Fractions obtained from aqueous extract, grouped into three major fractions (A, B and C) according to their Rf values. After purification and re-crystallization fraction A gives 24 mg, pale brown color powder (AQML1), fraction B gives 40 mg brown color powder (AQML2) and fraction C gives 36 mg, yellow color powder (AQML3). All isolated compounds AQML1, AQML2 and AQML3 were identified as Gallic acid, Ellagic acid and Rutin respectively after characterization by various methods.
Formulation development

On the basis of pharmacological evaluation aqueous extract was selected for formulation development (colon targeted drug delivery system). Hence core tablet of aqueous extract was prepared by using pectin matrix system and evaluated for various parameters. Core tablets of aqueous extract were further coated with enteric coating polymers (Eudragit S 100) with castor oil (plasticizer) and Talc (anti-adherent) by dip coating method for targeting colon. All batches of core and coated tablets were passes all evaluation parameters and dissolve within range in 0.1 N HCl and phosphate buffers (pH 6.6 and 7.4).