CONTENTS:

1. INTRODUCTION:
   1.1. Scenario of Herbal Drugs in Various Countries.
       1.1.1. China and Japan.
       1.1.2. U.S.A.
       1.1.3. Germany, France and other European countries.
       1.1.4. India.
   1.2. Quality of Indian Herbal Drugs.
   1.3. Quality of Indian Herbal Formulations.

2. LIVER
   2.1. Liver and its Functions.
   2.2. Causes of Liver Disorders.
   2.3. Types of Liver Disorders.
   2.4. Hepatic Functions Tests.
       2.4.1. Investigation of Pigmentary function.
       2.4.2. Investigation of Metabolic Function
       2.4.3. Investigation of Haemopoietic Function.
       2.4.4. Investigation of the Global Capacity.
   2.5. Treatment of Liver Disorders.
       2.5.1. Treatment of Liver disorders by Modern Drugs.
       2.5.2. Treatment of Liver disorders by Herbal Drugs and Herbal Formulations.
       2.5.3. Frequently used Herbs in Hepatoprotective Formulations.
       2.5.4. Pharmacological Evaluation of Some of the Herbs used in Hepatoprotective Formulations.
       2.5.5. Pharmacological Testing of Herbal Drugs for Hepatoprotective Activity.
   2.7. Antihapatotoxic Plant Constituents.
   2.8. Choleretic and Chologogue activities.
   2.9. Methods of Evaluation of Hepatoprotective Herbs:
       2.9.1. In vivo method.
       2.9.2. In vitro method.
   2.10. Development of Hepatoprotective Drugs.
   2.11. Lacunae observed in Hepatoprotective Herbal Drug Research.
### 3. AIM OF THE PRESENT WORK:

55

### 4. SELECTION OF HERBAL DRUGS:

56

### 5. INTRODUCTION TO THE HERBS AND REVIEW OF LITERATURE:

58

5.1. *Eclipta prostrata*  
5.1.1 Introduction.  
5.1.2. Ethnomedical uses  
5.1.3. Pharmacognostical Review  
5.1.4. Chemical Constituents.  
5.1.5. Pharmacological Review.  
5.1.6. Tissue Culture.  
5.1.7. Analysis of active constituents  
5.1.8. Another related Indian herb  

5.2. *Andrographis paniculata*  
5.2.1 Introduction.  
5.2.2. Ethnomedical uses  
5.2.3. Pharmacognostical Review  
5.2.4. Chemical Constituents.  
5.2.5. Pharmacological Review.  
5.2.6. Tissue Culture  
5.2.7. Analytical Review.  
5.2.8. Other Indian species of *Andrographis*  

5.3. *Phyllanthus amarus*  
5.3.1. Introduction.  
5.3.2. Ethnomedical uses.  
5.3.3. Pharmacognostical Review  
5.3.4. Chemical Constituents  
5.3.5. Pharmacological Review  
5.3.6. Analytical Review.  
5.3.7. Other Indian species of *Phyllanthus*  

5.4. *Solanum nigrum*  
5.4.1 Introduction.  
5.4.2. Ethnomedical uses.  
5.4.3. Pharmacognostical Review  
5.4.4. Chemical Constituents  
5.4.5. Pharmacological Review  
5.4.6. Analytical Review.  

### 6. EXPERIMENTAL AND RESULTS:

129

6.1. Material and method.  
129

135

6.3. Microscopical studies.  
138

6.3.1. *Eclipta prostrata*  
138
6.3.1.1. Lamina in surface view. 138
6.3.1.2. Transverse section of the leaf passing through midrib. 138
6.3.1.3. Transverse section of stem. 138
6.3.1.4. Transverse section of root. 141
6.3.1.5. Powder study of the herb. 141
6.3.2. *Andrographis paniculata*
6.3.2.1. Lamina in surface view. 141
6.3.2.2. Transverse section of the leaf passing through midrib. 144
6.3.2.3. Transverse section of stem. 144
6.3.2.4. Flowering shoot. 144
6.3.2.5. Transverse section of root. 147
6.3.2.6. Powder study of the herb. 147
6.3.3. *Phyllanthus amarus*
6.3.3.1. Lamina in surface view. 147
6.3.3.2. Transverse section of the leaf passing through midrib. 147
6.3.3.3. Transverse section of stem. 151
6.3.3.4. Transverse section of root. 151
6.3.3.5. Powder study of the herb. 154
6.3.4. *Solanum nigrum*
6.3.4.1. Lamina in surface view. 154
6.3.4.2. Transverse section of the leaf passing through midrib. 154
6.3.4.3. Transverse section of the stem. 157
6.3.4.4. Transverse section of the root. 157
6.3.4.5. Transverse section of the fruit. 161
6.3.4.6. Powder study of the herb. 161

6.4. Limits for quality parameters. 161

6.5. TLC studies of the herbs. 165
6.5.1. *Eclipta prostrata*
6.5.1.1. Extraction 165
6.5.1.2. TLC 165
6.5.2. *Andrographis paniculata*
6.5.2.1. Extraction 167
6.5.2.2. TLC 167
6.5.3. *Phyllanthus amarus*
6.5.3.1. Extraction 167
6.5.3.2. TLC 167
6.5.4. *Solanum nigrum*
6.5.4.1. Extraction 170
6.5.4.2. TLC 170

6.6. Isolation and identification of the hepatoprotective constituents of the herbs. 170
6.6.1. *E. prostrata*
6.6.1.1. Isolation of wedelolactone. 170
6.6.1.2. Identification of the compound. 172
6.6.2. *A. paniculata*

6.6.2.1 Isolation of andrographolide

6.6.2.2 Identification of the compound

6.6.3. *P. amarus*

6.6.3.1 Isolation of phyllanthin

6.6.3.2 Identification of the crystals.

6.6.4. *S. nigrum*

6.6.4.1 Isolation of solasodine.

6.6.4.2 Identification of the crystals.

6.7. Detection of unexplored hepatoprotective principles of the herbs.

6.7.1 Preparation of the extracts of *S. nigrum*

6.7.2 TLC studies of the extracts.

6.7.3 Determination of antioxidant activities of the extracts using DPPH reagent.

6.7.4 Estimation of reduction in hexobarbitone induced sleeping time of the extracts in mice.

6.7.5 Estimation of SGPT activity of the DPPH and hexobarbitone active extracts.

6.7.6 Column chromatography of the alcohol water extract.

6.7.7 Detection of flavonoids in the eluted compounds.

6.7.8 Estimation of antioxidant activity of the isolated compounds.

6.7.9 Determination of hexobarbitone sleeping time of the isolated quercetin glucoside from *S. nigrum*


6.8.1. *Eclipta prostrata*

6.8.1.1 Extraction

6.8.1.2 TLC

6.8.2. *Andrographis paniculata*

6.8.2.1 Extraction

6.8.2.2 TLC

6.8.3. *Phyllanthus amarus*

6.8.3.1 Extraction

6.8.3.2 TLC

6.8.4. *Solanum nigrum*

6.8.4.1 Extraction

6.8.4.2 TLC

6.9. Estimation of various active principles of the herbs and their polyherbal formulations by HPTLC methods.


6.9.b. HPTLC method.

6.9.1. *Eclipta prostrata*

6.9.1.1 Materials

6.9.1.2 Preparation of standard solution of wedelolactone

6.9.1.3 Preparation of sample solution.

6.9.1.4 Instrument.
6.9.1.5. HPTLC method.
6.9.1.6. Calibration curve of wedelolactone.
6.9.1.7. Estimation of wedelolactone in different samples.
6.9.1.8. Validation of HPTLC method.

6.9.2. Andrographis paniculata
   6.9.2.1. Materials
   6.9.2.2. Preparation of standard solution of andrographolide.
   6.9.2.3. Preparation of sample solution.
   6.9.2.4. Instrument.
   6.9.2.5. HPTLC method.
   6.9.2.6. Calibration curve of andrographolide.
   6.9.2.7. Estimation of andrographolide in different samples.
   6.9.2.8. Validation of HPTLC method.

6.9.3. Phyllanthus amarus
   6.9.3.1. Materials
   6.9.3.2. Preparation of standard solution of phyllanthin
   6.9.3.3. Preparation of sample solution
   6.9.3.4. Instrument.
   6.9.3.5. HPTLC method.
   6.9.3.6. Calibration curve of phyllanthin.
   6.9.3.7. Estimation of phyllanthin in different samples.
   6.9.3.8. Validation of HPTLC method.

6.9.4. Solanum nigrum

6.10. Estimation of various active constituents of the herbs and their polyherbal market formulations by HPLC method.
6.10.1. Eclipta prostrata
   6.10.1.1. Materials.
   6.10.1.2. Instruments.
   6.10.1.3. Calibration curve of wedelolactone.
   6.10.1.4. Preparation of sample solution.
   6.10.1.5. Estimation of wedelolactone in different samples.

6.10.2. Andrographis paniculata
   6.10.2.1. Materials.
   6.10.2.2. Instruments.
   6.10.2.3. Calibration curve of andrographolide.
   6.10.2.4. Preparation of samples and estimation of andrographolide in different samples.
   6.10.2.5. Validation of HPLC method.

6.10.3. Phyllanthus amarus
   6.10.3.1. Materials.
   6.10.3.2. Instruments.
   6.10.3.3. Calibration curve of phyllanthin.
   6.10.3.4. Sample preparation and estimation.
   6.10.3.5. Validation of HPLC method.
6.10.4. Solanum nigrum

6.10.4.1. Materials. 274
6.10.4.2. Preparation of standard solution of solasodine. 274
6.10.4.3. Instruments. 275
6.10.4.4. Calibration curve of solasodine. 275
6.10.4.5. Preparation of sample solution. 275
6.10.4.6. Estimation of solasodine in different samples. 275
6.10.4.7. Validation of HPLC method. 279

7. SUMMARY: 281

8. CONCLUSIONS: 283

9. REFERENCES: 284