## CONTENT OF THE THESIS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>DESCRIPTION</th>
<th>PAGE No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHAPTER 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1. Introduction</td>
<td></td>
<td>01</td>
</tr>
<tr>
<td>1.2. Diabetes Mellitus</td>
<td></td>
<td>02</td>
</tr>
<tr>
<td>1.3. Plant Medicine</td>
<td></td>
<td>09</td>
</tr>
<tr>
<td>1.3.1. Plant Description</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>1.3.2. Advantages of Herbal Medicine</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>1.4. Proteomics and Biomedicine</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>1.5. Proteomics in Drug Discovery</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>1.6. Proteomic Technologies</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.7 Aim and objectives</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

**CHAPTER 2**

Phytochemical Constituents Analysis, Evaluation of Effective Dose and Proteome Analysis in *Cynodon dactylon* (L.) pers.

| 2.1. Introduction | 18 |
| 2.2. Materials and Methods | 19 |
| 2.2.1. Collection and Authentication of Plant | 19 |
| 2.2.2. Aqueous Extract Preparation | 19 |
| 2.2.3. Ethanolic Extract Preparation | 19 |
| 2.2.4. Assessment of Hypoglycemic Activity in Normal Healthy Rats | 20 |
| 2.2.5. Assessment of Anti-Diabetic Activity by Glucose Tolerance in Diabetic Rats | 20 |
| 2.2.6. Assessment of Antidiabetic Potential for Plant Extract in Diabetic Rats | 21 |
| 2.2.7. LD50 | 21 |
## 3.3.2. Blood Glucose Level

## 3.3.3. Plasma and Organs Protein Profile

## 3.3.4. Plasma Lipid Profile

## 3.3.5. Plasma Enzymes Profile

## 3.3.6. Antioxidant Level

## 3.3.7. Histological Studies for Pancreatic Tissue

## 3.4. Discussion

### CHAPTER 4

**Comparative Analysis of Differential Protein Expression in Different Organs by Two-Dimensional Electrophoresis and Mass Spectrometry**

### 4.1. General Introduction-Proteomics

#### 4.1.1. Genomics to Proteomics

#### 4.1.2. Proteomics and Diabetes

#### 4.1.3. Proteomics and Biomarkers

#### 4.1.4. Proteomics and Biomedicine

#### 4.1.5. Proteomic Technologies

#### 4.1.6. 2D and MS-Diabetes Associated Proteomic Analysis

### 4.2. ORGANS AND ORGAN SYSTEMS

#### 4.2.1. PANCREAS

1. Pancreas Physiology Associated with Glucose Regulation
2. Diabetes Mellitus Occurring as a Consequence of Pancreas Pathology

#### 4.2.2. BRAIN ANATOMY

1. Brain Physiology Associated with Glucose Regulation
2. Brain-Diabetes is related to Several Pathologies

#### 4.2.3. HEART ANATOMY
4.2.3.1. Insulin and Glucose Regulation of Heart Function
4.2.3.2. Diabetes and Specific Cardiovascular Disease
4.2.3.3. Proteomics of Heart Disease
4.2.4. LIVER ANATOMY
4.2.4.1. Liver Physiology Associated with Glucose Regulation
4.2.4.2. Liver Disease Occurring as a Consequence of DM
4.2.4.3. Liver Pathology Associated with Proteomics
4.2.5. KIDNEY ANATOMY
4.2.5.1. Renal Physiology Associated with Glucose Regulation
4.2.5.2. Renal-Diabetes is Related to Several Pathologies
4.2.5.3. Renal Pathology Associated with Proteomics
4.2.6. SPLEEN ANATOMY
4.2.6.1. Spleen Physiology and Glucose Regulation
4.2.6.2. Spleen Physiology Associated with Diabetes Mellitus
4.2.6.3. Spleen Physiology and Para-physiology Associated with Proteomics
4.2.7. MUSCLE ANATOMY
4.2.7.1. Muscle Physiology Associated with Glucose Regulation
4.2.7.2. Muscle Physiology Associated with Diabetes Mellitus
4.2.7.3. Muscle Patho-Physiology Associated with Proteomics
4.2.8. ADIPOSE TISSUE
4.2.8.1. Adipose Tissue Physiology Associated with Glucose Regulation
4.2.8.2. Pathology of Adipose Tissue
4.2.8.3. Adipose Tissue Function Associated with Proteomics
4.2.9. BLOOD
4.2.9.1. Diseases Associated with Diabetes Mellitus
4.2.9.2. Plasma Protein Profiling
4.3. MATERIALS AND METHODS
4.3.1. Chemicals and Materials
4.3.2. Plant Material and Extract Preparation
4.3.3. Experimental Animals
4.3.4. Sample Preparation and 2-DE
4.3.5. MALDI–TOF–MS
4.3.6. Statistical Analysis

4.4. RESULTS

4.4.1. Identification and Characterization of Pancreas Proteomes
4.4.2. Identification and Characterization of Brain Proteomes
4.4.3. Identification and Characterization of Heart Proteomes
4.4.4. Identification and Characterization of Liver Proteomes
4.4.5. Identification and Characterization of Kidney Proteomes
4.4.6. Identification and Characterization of Spleen Proteomes
4.4.7. Identification and Characterization of Muscle Proteomes
4.4.8. Identification and Characterization of Adipose Tissues Proteomes
4.4.9. Identification and Characterization of Plasma Proteomes

4.5. DISCUSSION

4.5.1. Identification and Characterization of Pancreas Proteomes
4.5.1.1. Junction Plakoglobin
4.5.1.2. Adrenodoxin
4.5.1.3. Mediator of RNA Polymerase II Transcription Subunit-4
4.5.1.4. GTPase IMAP Family Member 4
4.5.2. Identification and Characterization of Brain Proteomes
4.5.2.1. Metabolic Signaling Protein
4.5.2.2. Vesicle Transport Signaling Protein
4.5.3. Identification and Characterization of Heart Proteomes
4.5.3.1. Neurotrophins
4.5.3.2. Electron Transfer Flavoprotein Subunit Beta
4.5.4. Identification and Characterization of Liver Proteomes
4.5.4.1. Cell Proliferation-Related Protein
4.5.4.2. Metabolism-Related Proteins
4.5.4.3. Acid–Base Balance Related Protein
4.5.5. Identification and Characterization of Kidney Proteomes
4.5.5.1. Transforming Protein RhoA
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5.5.2. Ras-Related Protein Rab-4A</td>
<td>151</td>
</tr>
<tr>
<td>4.5.5.3. Ras-Related Protein Rab-43</td>
<td>152</td>
</tr>
<tr>
<td>4.5.6. Identification and Characterization of Spleen Proteomes</td>
<td>153</td>
</tr>
<tr>
<td>4.5.6.1. Ca(^{2+})-Binding Protein p22</td>
<td>153</td>
</tr>
<tr>
<td>4.5.6.2. Aldose Reductase</td>
<td>155</td>
</tr>
<tr>
<td>4.5.6.3. 78-kDa Glucose-Regulated Protein</td>
<td>156</td>
</tr>
<tr>
<td>4.5.6.4. Coactosin-Like Protein</td>
<td>158</td>
</tr>
<tr>
<td>4.5.7. Identification and Characterization of Muscle Proteomes</td>
<td>160</td>
</tr>
<tr>
<td>4.5.7.1. Metabolism Related Protein</td>
<td>160</td>
</tr>
<tr>
<td>4.5.8. Identification and Characterization of Adipose Tissues Proteomes</td>
<td>162</td>
</tr>
<tr>
<td>4.5.8.1. Transcriptional Activation and Processing Protein</td>
<td>162</td>
</tr>
<tr>
<td>4.5.8.2. Signal Transduction Cascade Protein</td>
<td>164</td>
</tr>
<tr>
<td>4.5.9. Identification and Characterization of Plasma Proteomes</td>
<td>165</td>
</tr>
<tr>
<td>4.5.9.1. Lipid Metabolism Associated Protein</td>
<td>165</td>
</tr>
<tr>
<td>4.5.9.2. Antioxidant activity related proteins</td>
<td>166</td>
</tr>
<tr>
<td>4.5.9.3. Muscle Function Related Function</td>
<td>168</td>
</tr>
</tbody>
</table>

5. SUMMARY AND CONCLUSION

6. REFERENCES

7. LIST OF PUBLICATIONS

1. A Study on the protective effect of *Cynodon dactylon* leaves extract in diabetic rats.


3. Characterization of the brain proteome of rats with diabetes mellitus through two-dimensional electrophoresis and mass spectrometry

Appendix