Chapter III  

Antidiabetic activity of ethyl acetate extracts of *M. charantia, A. marmelos* and *C. auriculata* in alloxan induced diabetic male albino rats.  

Chapter III deals with the effect of *M. charantia, A. marmelos* and *C. auriculata* in ethyl acetate extracts on body weight, blood glucose, serum insulin, lipid profile, urea, uric acid and creatinine in normal, diabetic control and experimental rats were studied.  

**Effect of *M. charantia* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats**  

Table -19 describes the body weight, blood glucose and serum insulin levels in normal, diabetic control and experimental animals. In diabetic control animals, the body weight was significantly decreased by 22.80 %, when compared to the levels in normal animals. After administration of *M. charantia* ethyl acetate extract at a gradient dose of 250 mg/kg bw and 350 mg/kg bw, the animals regained their body weight by 8.85 % and 11.50 % respectively; when compared to diabetic control groups.  

In Group II diabetic control animals, the level of blood glucose elevated significantly by 278.05 % compared to normal groups. After administration of *M. charantia* ethyl acetate extract to Group III and Group IV animals (250 mg/kg bw and 350 mg/kg bw) the level of glucose decreased by 46.39 % and 48.96 %, whereas in glibenclamide treated animals the glucose level decreased by 64.20 %, compared to the diabetic control animals.  

The level of the serum insulin in Group II diabetic control animals was decreased by 46.10 %, when compared with Group I animals. In Group III and IV animals, the insulin levels showed a significant increase by 9.62 % and 17.10 % respectively; when compared to
the diabetic control animals. In glibenclamide administrated Group V animals, the insulin level increased by 76.45% in comparison to diabetic control Group II animals.

Analysis of result from the Table -19 shows that there was a progressive increase in body weight and insulin level and also fall in blood sugar level after the intake of *M. charantia* ethyl acetate extract. These results were on par with the standard drug.
Table 19

The effect of *M. charantia* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Body Weight (g)</th>
<th>Blood Glucose (mg%)</th>
<th>Serum Insulin (µU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>195.17±4.02</td>
<td>99.50±3.83</td>
<td>57.83±3.19</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>150.67±2.73</td>
<td>376.16±8.73</td>
<td>31.17±2.86</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>-22.80</td>
<td>278.05</td>
<td>-46.10</td>
</tr>
<tr>
<td>III <em>M. charantia</em> treated</td>
<td>164.00±3.74</td>
<td>201.67±4.32</td>
<td>34.17±2.32</td>
</tr>
<tr>
<td>(250 mg/kg bw)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>8.85</td>
<td>-46.39</td>
<td>9.62</td>
</tr>
<tr>
<td>IV <em>M. charantia</em> treated</td>
<td>168.00±2.37</td>
<td>192.00±4.05</td>
<td>36.50±1.87</td>
</tr>
<tr>
<td>(350 mg/kg bw)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>11.50</td>
<td>-48.96</td>
<td>17.10</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>182.33±3.93</td>
<td>134.67±4.41</td>
<td>55.00±1.41</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>21.01</td>
<td>-64.20</td>
<td>76.45</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, *P*<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Effect of *M. charantia* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

Table -20 represented the levels of lipid profile such as TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals. In diabetic control Group II animals the levels of TC, TG, LDL and VLDL were elevated and the HDL level was reduced, when compared to the normal Group I animals. After administration of *M. charantia* ethyl acetate extract to Group III and Group IV animals at a gradient dose of 250 mg/kg bw and 350 mg/kg bw, there was depletion in TC by 23.76 % and 25.29 %, TG by 40.90 % and 45.57 %, LDL by 29.94 % and 35.63 % and VLDL by 40.89 % and 45.56 % respectively. Also, there was a significant increase in HDL by 78.95 % in 250 mg/kg bw and 120.16 % in 350 mg/kg bw as compared to Group II diabetic animals. As expected in glibenclamide treated Group V animals, the increased levels of TC, TG, LDL, VLDL and decreased HDL reverted to near normal values. The levels of TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals were also represented in Figure -11.

Effect of *M. charantia* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

The level of urea, uric acid and creatinine in normal, control and experimental groups were presented in the Table -21. In diabetic control Group II animals, all three tested renal markers urea, uric acid and creatinine were significantly increased by 70.67 %, 112.31 %, and 286.36 %, when compared to the normal Group I animals. In *M. charantia* ethyl acetate extract treated Group III and Group IV animals the levels of urea, uric acid and creatinine were reversed these changes: urea by 26.77 % and 28.29 %, uric acid by 29.71 % and 39.49 %, and creatinine by 31.37 % and 56.47 % respectively. Administration of glibenclamide to Group V animals reverted the changes to near normal level.
The effect of *M. charantia* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>TC (mg%)</th>
<th>TG (mg%)</th>
<th>HDL (mg%)</th>
<th>LDL (mg%)</th>
<th>VLDL (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>124.83±4.02</td>
<td>100.83±4.45</td>
<td>54.66±3.08</td>
<td>50.00±4.54</td>
<td>20.13±.88</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>231.33±4.63</td>
<td>285.67±7.89</td>
<td>19.00±3.74</td>
<td>155.20±3.63</td>
<td>57.13±1.58</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>85.32</td>
<td>183.32</td>
<td>-65.24</td>
<td>210.4</td>
<td>183.81</td>
</tr>
<tr>
<td>III <em>M. charantia</em> treated (250 mg/kg bw)</td>
<td>176.33±3.56</td>
<td>168.83±2.86</td>
<td>34.00±2.36</td>
<td>108.73±1.51</td>
<td>33.77±0.57</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-23.76</td>
<td>-40.90</td>
<td>78.95</td>
<td>-29.94</td>
<td>-40.89</td>
</tr>
<tr>
<td>IV <em>M. charantia</em> treated (350 mg/kg bw)</td>
<td>172.83±2.93</td>
<td>155.50±3.51</td>
<td>41.83±2.31</td>
<td>99.90±0.94</td>
<td>31.10±0.70</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-25.29</td>
<td>-45.57</td>
<td>120.16</td>
<td>35.63</td>
<td>-45.56</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>128.00±5.02</td>
<td>132.16±3.06</td>
<td>51.33±2.80</td>
<td>50.23±2.23</td>
<td>26.43±0.61</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-44.66</td>
<td>-53.74</td>
<td>170.16</td>
<td>-67.64</td>
<td>-53.74</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Figure 11
The effect of *M. charantia* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

![Graph showing lipid profile](image)

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals.

**Group I** – Normal, **Group II** – Diabetic Control, **Group III** – *M. charantia* treated (250 mg/kg bw), **Group IV** - *M. charantia* treated (350 mg/kg bw), and **Group V** – Drug treated.
Table 21

The effect of *M. charantia* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Urea  (mg%)</th>
<th>Uric Acid (mg%)</th>
<th>Creatinine (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>38.67±2.16</td>
<td>1.30±0.24</td>
<td>0.66±0.04</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>66.00±2.09</td>
<td>2.76±0.16</td>
<td>2.55±0.07</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>70.67</td>
<td>112.31</td>
<td>286.36</td>
</tr>
<tr>
<td>III <em>M. charantia</em> treated</td>
<td>48.33±2.16</td>
<td>1.94±0.03</td>
<td>1.75±0.03</td>
</tr>
<tr>
<td>(250 mg/kg bw)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-26.77</td>
<td>-29.71</td>
<td>-31.37</td>
</tr>
<tr>
<td>IV <em>M. charantia</em> treated</td>
<td>47.33±2.16</td>
<td>1.67±0.03</td>
<td>1.11±0.02</td>
</tr>
<tr>
<td>(350 mg/kg bw)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-28.29</td>
<td>-39.49</td>
<td>-56.47</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>42.50±2.88</td>
<td>1.44±0.03</td>
<td>0.84±0.03</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-35.60</td>
<td>-47.83</td>
<td>-67.06</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Effect of *A. marmelos* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats

Table -22 describes the body weight, blood glucose and serum insulin levels in normal, diabetic control and experimental animals. In diabetic control animals, the body weight was significantly decreased by 22.80 %, when compared to the levels in normal animals. After administration of *A. marmelos* ethyl acetate extract at a gradient dose of 250 mg/kg bw and 350 mg/kg bw, the animals regained their body weight by 5.74 % and 9.40 % respectively; when compared to diabetic control groups. The body weight increased in standard drug (glibenclamide) treated animal was 21.01% when compared to diabetic control group.

In Group II diabetic control animals, the level of blood glucose elevated significantly by 278.05 % compared to the normal groups. After administration of *A. marmelos* extract to Group III and Group IV animals (250 mg/kg bw and 350 mg/kg bw) the level of glucose decreased by 35.27 % and 46.97 %, whereas in glibenclamide treated animals the glucose level decreased by 64.20 %, compared to the diabetic control animals.

The level of the serum insulin in Group II diabetic control animals was decreased by 46.10 %, when compared to Group I animals. In Group III and IV animals, the insulin levels showed a significant increase by 9.07 % and 14.44 % respectively; when compared to the diabetic control animals. In glibenclamide administrated Group V animals, the insulin level increased by 76.45 % in comparison to diabetic control Group II animals.
Table 22
The effect of *A. marmelos* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Body Weight (g)</th>
<th>Blood Glucose (mg%)</th>
<th>Serum Insulin (µU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>195.17±4.02</td>
<td>99.50±3.83</td>
<td>57.83±3.19</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>150.67±2.73</td>
<td>376.16±8.73</td>
<td>31.17±2.86</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>-22.80</td>
<td>278.05</td>
<td>-46.10</td>
</tr>
<tr>
<td>III <em>A. marmelos</em> treated</td>
<td>159.33±2.80</td>
<td>243.50±4.23</td>
<td>34.00±3.22</td>
</tr>
<tr>
<td>(250 mg/kg bw)</td>
<td>5.74</td>
<td>-35.27</td>
<td>9.07</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV <em>A. marmelos</em> treated</td>
<td>164.83±2.23</td>
<td>199.50±3.73</td>
<td>35.67±3.27</td>
</tr>
<tr>
<td>(350 mg/kg bw)</td>
<td>9.40</td>
<td>-46.97</td>
<td>14.44</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V Drug treated</td>
<td>182.33±3.93</td>
<td>134.67±4.41</td>
<td>55.00±1.41</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>21.01</td>
<td>-64.20</td>
<td>76.45</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Effect of *A. marmelos* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

Table -23 represented the levels of lipid profile such as TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals. In diabetic control Group II animals the levels of TC, TG, LDL and VLDL were elevated and the HDL level was reduced, when compared to the normal Group I animals. After administration of *A. marmelos* extract to Group III and Group IV animals at a gradient dose of 250 mg/kg bw and 350 mg/kg bw, there was depletion in TC by 13.04 % and 16.06 %, TG by 37.87 % and 41.31 %, LDL by 14.63 % and 20.34 % and VLDL by 37.83 % and 41.31 % respectively. Also, there was a significant increase in HDL by 74.58 % in 250 mg/kg bw and 94.74 % in 350 mg/kg bw as compared with diabetic control animals. As expected in glibenclamide treated Group V animals, the increased levels of TC, TG, LDL, VLDL and decreased HDL reverted to near normal values. The levels of TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals were also represented in Figure -12.

Effect of *A. marmelos* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

The level of urea, uric acid and creatinine in normal, control and experimental groups were presented in the Table -24. In diabetic control Group II animals, all three tested renal markers urea, uric acid and creatinine were significantly increased by 70.67 %, 112.31 %, and 286.36 %, when compared to the normal Group I animals. In plant extract treated Group III and Group IV animals the levels of urea, uric acid and creatinine were reversed to near normal level: urea by 8.85 % and 17.42 %, uric acid by 22.46 % and 32.61 %, and creatinine by 23.53 % and 55.29 % respectively. Administration of glibenclamide to Group V animals reversed the changes to near normal level.
The effect of *A. marmelos* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>TC (mg%)</th>
<th>TG (mg%)</th>
<th>HDL (mg%)</th>
<th>LDL (mg%)</th>
<th>VLDL (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>124.83±4.02</td>
<td>100.83±4.45</td>
<td>54.66±3.08</td>
<td>50.00±4.54</td>
<td>20.13±.88</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>231.33±4.63</td>
<td>285.67±7.89</td>
<td>19.00±3.74</td>
<td>155.20±3.63</td>
<td>57.13±1.58</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>85.32</td>
<td>183.32</td>
<td>-65.24</td>
<td>210.4</td>
<td>183.81</td>
</tr>
<tr>
<td>III <em>A. marmelos</em> treated</td>
<td>201.17±2.64</td>
<td>177.50±3.62</td>
<td>33.17±2.32</td>
<td>132.50±2.31</td>
<td>35.50±0.72</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-13.04</td>
<td>-37.87</td>
<td>74.58</td>
<td>-14.63</td>
<td>-37.83</td>
</tr>
<tr>
<td>IV <em>A. marmelos</em> treated</td>
<td>194.17±3.06</td>
<td>167.67±3.39</td>
<td>37.00±2.37</td>
<td>123.63±0.34</td>
<td>33.53±0.68</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-16.06</td>
<td>-41.31</td>
<td>94.74</td>
<td>-20.34</td>
<td>-41.31</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>128.00±5.02</td>
<td>132.16±3.06</td>
<td>51.33±2.80</td>
<td>50.23±2.23</td>
<td>26.43±0.61</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-44.66</td>
<td>-53.74</td>
<td>170.16</td>
<td>-67.64</td>
<td>-53.74</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals.

**Group I** – Normal, **Group II** – Diabetic Control, **Group III** – *A. marmelos* treated (250 mg/kg bw), **Group IV** - *A. marmelos* treated (350 mg/kg bw), and **Group V** – Drug treated.
**Table 24**

The effect of *A. marmelos* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Urea (mg%)</th>
<th>Uric Acid (mg%)</th>
<th>Creatinine (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>38.67±2.16</td>
<td>1.30±0.24</td>
<td>0.66±0.04</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>66.00±2.09</td>
<td>2.76±0.16</td>
<td>2.55±0.07</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>70.67</td>
<td>112.31</td>
<td>286.36</td>
</tr>
<tr>
<td>III <em>A. marmelos</em> treated (250 mg/kg bw)</td>
<td>60.16±1.72</td>
<td>2.14±0.03</td>
<td>1.95±0.02</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-8.85</td>
<td>-22.46</td>
<td>-23.53</td>
</tr>
<tr>
<td>IV <em>A. marmelos</em> treated (350 mg/kg bw)</td>
<td>54.50±2.74</td>
<td>1.86±0.03</td>
<td>1.14±0.03</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-17.42</td>
<td>-32.61</td>
<td>-55.29</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>42.50±2.88</td>
<td>1.44±0.03</td>
<td>0.84±0.03</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-35.60</td>
<td>-47.83</td>
<td>-67.06</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Effect of *C. auriculata* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats

Table -25 demonstrates the body weight, blood glucose and serum insulin levels in normal, diabetic control and experimental animals. In diabetic control animals, the body weight was significantly decreased by 22.80 %, when compared to the levels in normal animals. In *C. auriculata* ethyl acetate extract treated groups, the body weight increased significantly by 4.98 % in 250 mg/kg bw and 7.19 % in 350 mg/kg bw, when compared with diabetic control groups. The body weight increased in standard drug (glibenclamide) treated animal was 21.01% when compared to diabetic control group.

In diabetic control Group II animals, the level of blood glucose elevated significantly by 278.05 % compared to normal groups. After administration of *C. auriculata* extract to Group III and Group IV animals (250 mg/kg bw and 350 mg/kg bw) the level of glucose decreased by 38.68 % and 47.36 %, whereas in glibenclamide treated animals the glucose level decreased by 64.20 %, compared to the diabetic control animals.

The level of the serum insulin in Group II diabetic control animals was decreased by 46.10 %, when compared to Group I animals. In Group III and IV animals, the insulin levels showed a significant increase by 5.87 % and 12.29 % respectively; when compared to the diabetic control animals, whereas in glibenclamide treated animals the insulin level was increased by 76.45 %, compared to the diabetic control animals.
Table 25

The effect of *C. auriculata* ethyl acetate extract on body weight, blood glucose and serum insulin levels of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Body Weight (g)</th>
<th>Blood Glucose (mg%)</th>
<th>Serum Insulin (µU/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>195.17±4.02</td>
<td>99.50±3.83</td>
<td>57.83±3.19</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>150.67±2.73</td>
<td>376.16±8.73</td>
<td>31.17±2.86</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>-22.80</td>
<td>278.05</td>
<td>-46.10</td>
</tr>
<tr>
<td>III <em>C. auriculata</em> treated (250 mg/kg bw)</td>
<td>158.17±3.82</td>
<td>230.67±3.14</td>
<td>33.00±2.37</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>4.98</td>
<td>-38.68</td>
<td>5.87</td>
</tr>
<tr>
<td>IV <em>C. auriculata</em> treated (350 mg/kg bw)</td>
<td>161.50±3.56</td>
<td>198.00±3.58</td>
<td>35.00±2.61</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>7.19</td>
<td>-47.36</td>
<td>12.29</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>182.33±3.93</td>
<td>134.67±4.41</td>
<td>55.00±1.41</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>21.01</td>
<td>-64.20</td>
<td>76.45</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
Effect of *C. auriculata* in ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

Table -26 represented the levels of lipid profile such as TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals. In diabetic control Group II animals the levels of TC, TG, LDL and VLDL were elevated, when compared to the normal Group I animals. After administration of *C. auriculata* ethyl acetate extract to Group III and Group IV animals there was depletion in TC by 24.93 % and 23.99 %, TG by 39.73 % and 42.24 %, LDL by 31.76 % and 34.71 % and VLDL by 39.73 % and 42.24 % respectively. Also there was a significant increase in HDL by 75.42 % in 250 mg/kg bw and 118.42 % in 350 mg/kg bw as compared to Group II diabetic control animals. As expected in glibenclamide treated Group V animals, the increased levels of TC, TG, LDL, VLDL and decreased HDL reverted to near normal values. The levels of TC, TG, LDL, VLDL and HDL in normal, diabetic control and plant extract treated animals were also represented in Figure -13.

Effect of *C. auriculata* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

The level of urea, uric acid and creatinine in normal, control and experimental groups were presented in the Table -27. In diabetic control Group II animals, all three tested renal markers urea, uric acid and creatinine were significantly increased by 70.67 %, 112.31 %, and 286.36 %, when compared to the normal Group I animals. In *C. auriculata* extract treated Group III and Group IV animals the levels of urea, uric acid and creatinine were reversed these changes: urea by 9.59 % and 13.38 %, uric acid by 24.64 % and 35.87 %, and creatinine by 27.06 % and 54.90 % respectively. Administration of glibenclamide to Group V animals reversed the changes to near normal level.
Table 26

The effect of *C. auriculata* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>TC (mg%)</th>
<th>TG (mg%)</th>
<th>HDL (mg%)</th>
<th>LDL (mg%)</th>
<th>VLDL (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>124.83±4.02</td>
<td>100.83±4.45</td>
<td>54.66±3.08</td>
<td>50.00±4.54</td>
<td>20.13±.88</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>231.33±4.63</td>
<td>285.67±7.89</td>
<td>19.00±3.74</td>
<td>155.20±3.63</td>
<td>57.13±1.58</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>85.32</td>
<td>183.32</td>
<td>-65.24</td>
<td>210.4</td>
<td>183.81</td>
</tr>
<tr>
<td>III <em>C. auriculata</em> treated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(250 mg/kg bw)</td>
<td>173.67±2.80</td>
<td>172.17±2.32</td>
<td>33.33±2.16</td>
<td>105.90±2.86</td>
<td>34.43±0.46</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-24.93</td>
<td>-39.73</td>
<td>75.42</td>
<td>-31.76</td>
<td>-39.73</td>
</tr>
<tr>
<td>IV <em>C. auriculata</em> treated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(350 mg/kg bw)</td>
<td>175.83±2.56</td>
<td>165.00±3.22</td>
<td>41.50±1.87</td>
<td>101.33±1.04</td>
<td>33.00±0.65</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-23.99</td>
<td>-42.24</td>
<td>118.42</td>
<td>-34.71</td>
<td>-42.24</td>
</tr>
<tr>
<td>V Drug treated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-44.66</td>
<td>-53.74</td>
<td>170.16</td>
<td>-67.64</td>
<td>-53.74</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.
The effect of *C. auriculata* ethyl acetate extract on lipid profile of normal, diabetic control and experimental rats

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals.

**Group I** – Normal, **Group II** – Diabetic Control, **Group III** – *C. auriculata* treated (250 mg/kg bw), **Group IV** - *C. auriculata* treated (350 mg/kg bw), and **Group V** – Drug treated.
Table 27

The effect of *C. auriculata* ethyl acetate extract on urea, uric acid and creatinine of normal, diabetic control and experimental rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Urea (mg%)</th>
<th>Uric Acid (mg%)</th>
<th>Creatinine (mg%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Normal (N)</td>
<td>38.67±2.16</td>
<td>1.30±0.24</td>
<td>0.66±0.04</td>
</tr>
<tr>
<td>II Diabetic Control (DC)</td>
<td>66.00±2.09</td>
<td>2.76±0.16</td>
<td>2.55±0.07</td>
</tr>
<tr>
<td>% of Change (N Vs DC)</td>
<td>70.67</td>
<td>112.31</td>
<td>286.36</td>
</tr>
<tr>
<td>III <em>C. auriculata</em> treated (250 mg/kg bw)</td>
<td>59.67±2.07</td>
<td>2.08±0.03</td>
<td>1.86±0.03</td>
</tr>
<tr>
<td>% of Change (Group III Vs DC)</td>
<td>-9.59</td>
<td>-24.64</td>
<td>-27.06</td>
</tr>
<tr>
<td>IV <em>C. auriculata</em> treated (350 mg/kg bw)</td>
<td>57.17±2.63</td>
<td>1.77±0.03</td>
<td>1.15±0.03</td>
</tr>
<tr>
<td>% of Change (Group IV Vs DC)</td>
<td>-13.38</td>
<td>-35.87</td>
<td>-54.90</td>
</tr>
<tr>
<td>V Drug treated</td>
<td>42.50±2.88</td>
<td>1.44±0.03</td>
<td>0.84±0.03</td>
</tr>
<tr>
<td>% of Change (Group V Vs DC)</td>
<td>-35.60</td>
<td>-47.83</td>
<td>-67.06</td>
</tr>
</tbody>
</table>

The data were expressed as mean ± SD and each value represents six individual observations, evaluated one-way ANOVA. ‘P’ denotes the statistical significance, P<0.001. Diabetic control was compared with normal and treated groups were compared with diabetic control animals. + & - indicated the percentage of change over the diabetic control and treated groups.