CHAPTER 5

Results

5.1 Results of *Boerhavia diffusa*

5.1.1 *In-vitro* antioxidant scavenging activity

5.1.1.1 Determination of total phenolic and flavonoids contents

Table 5.1 shows the total phenolic and flavonoids content of *B. diffusa*. The extract had 252.63 ± 3.19 µg/ml phenolic equivalent to 250 µg/ml of gallic acid and flavonoids content was 38.00 ± 2.17 µg/ml which was equivalent to 350 µg/ml of rutin standard.

5.1.1.2 1,1-diphenyl-2-picryl hydrazine (DPPH) scavenging activity

The antioxidants react with the stable free radical 1,1-diphenyl-2-picryl hydrazine (DPPH) convert into 1,1-diphenyl-2-picryl hydrazone with decolouration. The scavenging effect of extract was dose dependent. The percentage inhibitions at concentrations of ascorbic acid 0.025, 0.05, 0.5, 1.0, 1.25, 1.50 mg/ml were 44.42, 56.74, 71.45, 90.8,8 98.10 and 104.39 % and by extract 36.91, 46.44, 70.29, 81.03, 84.91 and 91.25 % respectively (Table 5.2). The scavenging effect of ethanolic extract presented 91.25% at the concentration of 1.50 mg/ml and the IC$_{50}$ of the extract was 0.13 mg/ml.

5.1.1.3 Nitrous oxide scavenging activity

The *B. diffusa* root extracts showed significant free radical scavenging action against nitric oxide (NO) induced release of free radicals. The ethanolic extract of *B. diffusa* in concentration of 10, 20, 30, 40, 50 and 60 mg/ml showed 28.67, 47.34, 53.45, 66.47, 76.31 and 90.39% inhibition of respectively. The standard ascorbic acid showed the percentage inhibition of 95.31% at 60 mg/ml (Table 5.3) and the IC$_{50}$ was 80 mg/ml.
5.1.1.4 Reducing potential activity

The reducing power of ethanolic extract of *B. diffusa* has been summarized in Table 5.4. The data showed that all the samples increased their reducing ability when the concentration of extracts was increased.

5.1.1.5 Ferric thiocyanate scavenging activity

The amount of peroxides at the beginning of the lipid per oxidation was measured by ferric thiocyanate method. Table 5.5 showed the percentage inhibitory potential of *B. diffusa* ethanolic extract reached a maximum of 88.59 ± 1.72 at 150 mg/ml. In comparison the ascorbic acid showed the maximum activity of 91.47 % at 150 mg/ml and the IC$_{50}$ was 71 mg/ml.

**Table 5.1** Polyphenol and flavonoidal content of *Boerhavia diffusa* extract

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameters</th>
<th>Ethanolic extract <em>B. diffusa</em> (μg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Phenolic</td>
<td>252.63 ± 3.19</td>
</tr>
<tr>
<td>2</td>
<td>Total Flavonoid</td>
<td>38.00 ± 2.17</td>
</tr>
</tbody>
</table>

**Table 5.2** DPPH free radical scavenging activity of *B. diffusa* root extract

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Concentration (mg/ml)</th>
<th>% inhibition by Ascorbic acid</th>
<th>% inhibition by <em>B. diffusa</em> root extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.025</td>
<td>44.42 ± 2.16</td>
<td>36.91 ± 2.42</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
<td>56.74 ± 6.07</td>
<td>46.44 ± 2.29</td>
</tr>
<tr>
<td>3</td>
<td>0.50</td>
<td>71.45 ± 3.45</td>
<td>70.29 ± 2.81</td>
</tr>
<tr>
<td>4</td>
<td>1.00</td>
<td>90.88 ± 2.65</td>
<td>81.03 ± 1.47</td>
</tr>
<tr>
<td>5</td>
<td>1.25</td>
<td>98.1 ± 1.77</td>
<td>84.91 ± 1.70</td>
</tr>
<tr>
<td>6</td>
<td>1.50</td>
<td>104.39 ± 3.74</td>
<td>91.25 ± 2.26</td>
</tr>
</tbody>
</table>
Table 5.3 Effect of *B. diffusa* root extract on percentage inhibition of nitric acid

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Concentration (mg/ml)</th>
<th>% inhibition by Ascorbic acid</th>
<th>% inhibition by <em>B. diffusa</em> root extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>38.15 ± 1.13</td>
<td>28.67 ± 1.18</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>50.91 ± 2.01</td>
<td>47.34 ± 1.49</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>51.17 ± 2.12</td>
<td>53.45 ± 1.58</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>68.74 ± 1.81</td>
<td>66.47 ± 2.36</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>90.62 ± 1.06</td>
<td>76.31 ± 2.17</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>95.31 ± 1.29</td>
<td>90.39 ± 1.23</td>
</tr>
</tbody>
</table>

Table 5.4 Reducing activity of *B. diffusa* root extract

<table>
<thead>
<tr>
<th>Drug</th>
<th>Concentration (mg/ml)</th>
<th>Absorbance (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. diffusa</em> root</td>
<td>20</td>
<td>0.198 ± 0.002</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>0.235 ± 0.001</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>0.231 ± 0.001</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>0.297 ± 0.001</td>
</tr>
<tr>
<td></td>
<td>140</td>
<td>0.350 ± 0.005</td>
</tr>
<tr>
<td>Gallic acid</td>
<td>50</td>
<td>0.210 ± 0.001</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>0.320 ± 0.005</td>
</tr>
</tbody>
</table>
**Table 5.5** Effect of *B. diffusa* root extract on percentage inhibition of thiocyanate

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Concentration (mg/ml)</th>
<th>% inhibition by Ascorbic acid</th>
<th>% inhibition by <em>B. diffusa</em> root</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>32.51 ± 1.8</td>
<td>45.48 ± 2.65</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>41.95 ± 1.96</td>
<td>47.2 ± 1.27</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>75.5 ± 2.71</td>
<td>55.91 ± 2.37</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>80.19 ± 2.12</td>
<td>67.44 ± 1.65</td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>88.64 ± 1.68</td>
<td>78.6 ± 1.62</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>91.47 ± 3.12</td>
<td>88.59 ± 1.72</td>
</tr>
</tbody>
</table>
5.1.1.6 HPTLC analysis of *B. diffusa* root extract

Table 5.6 shows the R<sub>f</sub> values of ethanolic extract of *B. diffusa* (Figure 5.1 & 5.2) through HPTLC fingerprinting techniques. It can be used for quality control and identification of raw materials used for preparation of formulations. The extract was dried and dissolved in methanol to give 10 mg/ml solution and used for sample application in HPTLC plates for development of fingerprinting. The solvent system (chloroform : methanol, 8 : 2) was developed for *B. diffusa*. The sample was applied (10 µl each) using Linomat 5-sample application device on precoated silica gel 60 F<sub>254</sub> sheet (thickness= 0.2). The plates were developed in glass chamber and used for scanning at 254 and 366 nm wavelength respectively for detection of active compound.

The extract used for HPTLC analysis, but it was dissolve in methanol because it dissolves maximum constituents of ethanolic extract with low spreadability over the surface of plate as compared to ethanol which results in separation of mixture in compact bond.

**Table: 5.6** R<sub>f</sub> values and area of each spots of HPTLC fingerprinting of different extract

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Extract</th>
<th>λ (nm)</th>
<th>R&lt;sub&gt;f&lt;/sub&gt; values</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>B. diffusa</em></td>
<td>254</td>
<td>0.11, 0.28</td>
<td>625.52, 4821.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.38, 0.43</td>
<td>635.28, 498.76</td>
</tr>
<tr>
<td>2</td>
<td><em>B. diffusa</em></td>
<td>366</td>
<td>0.61, 0.90</td>
<td>6647.29, 1029.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.1: HPTLC finger printing profile of *B. diffusa* extract.

The peaks obtained after HPTLC fingerprinting of *B. diffusa* extract (Figure 5.1) at 254 nm, were similar to the peaks of phytoconstituents studied under literature survey, they may be punaranavine, boerhavine. Some additional peaks were also obtained these may be a mixture of alkaloids.
Figure 5.2 HPTLC finger printing of *B. diffusa* extract.

At 366 nm the peaks obtained (Figure 5.2), were nearly similar to the peaks of phytoconstituents studied before, they may be of punaranavine or boerhavine or both.
5.1.2 Toxico-logical studies

5.1.2.1 Acute toxicity study

Mice administered with *Boerhavia diffusa* in doses of 50, 300 and 2000 mg/kg respectively did not show any abnormal behaviour during initial 4 hours of drug administration. No mortality was observed during 14 days after treatment with extract in either sex. Therefore, one-tenth (200 mg/kg) of the maximum tolerated dose of the extract (2000 mg/kg) were selected for the antiobesity study. Further, the selected dose of 200 mg/kg served as middle dose and half of the middle dose (100 mg/kg) served as low dose and double of the middle dose (400 mg/kg) served as high dose.

5.1.3 Pharmacological studies

5.1.3.1 Effect of *Boerhavia diffusa* root extract (BDRE) on body weight, food intake and organ fat pad weights in SD rats after 60 days of treatment

5.1.3.1.1 Body weight

Table 5.7 shows the initial and final body weights of normal and high fat diet groups of animals. The final body weight of HFD diet treated animals was 326.25 ± 8.96 g which significantly increased (p<0.01) when compared with normal group animals. The body weight of sibutramine (5 mg/kg) and BDRE treated groups (200 & 400 mg/kg) were 231.67 ± 6.49 (p<0.01), 242.34 ± 6.73 (p<0.01) and 255.00 ± 7.36 g (p<0.05), which was significantly reduced when compared with HFD group animals. While BDRE treated group (100 mg/kg/day) showed non significant effect on body weight when compared with HFD group animals.

Similarly % increase in body weight was found to be 141.67 (group II) when compared to group I (54.96) animal. Group II is highest among all which indicated that HFD animals gaining in the body weight and other groups were losing the % body weight 72.16 (group III), 36.20 (group IV), 61.05 (group V) and 55.09 (group VI) on treatment of different doses of standard drug.
(Sibutramine 5 mg/kg) and BDRE (200 and 400 mg/kg) respectively when compared to HFD group II of animals.

5.1.3.1.2 Food intake

Food intake pattern of HFD and normal group animals are shown in Table 5.8. The food intake after 7 days in HFD group significantly increased (p<0.01) from normal of 10.29 ± 1.12 to 14.05 ± 2.30. The food intake of sibutramine (5 mg/kg) treated group was 11.38 ± 1.29 which was significantly (p<0.01) reduced when compared with HFD group animals. The BDRE-treated (200 & 400 mg/kg) of groups animals significantly decreased (p<0.01 & p<0.05) consumption of food (11.86 ± 1.12 & 12.19 ± 1.43) when compared with HFD group animals. However, the BDRE-treated with 100 mg/kg consumed more food (13.14 ± 1.98) showed non significant effects when compared with high HFD group animals.

5.1.3.1.3 Organ fat pad weight

The HFD increased the organ fat pad weight viz. heart (2.31 ± 0.09), kidney (1.57 ± 1.23), liver (2.36 ± 0.13) and uterus (2.70 ± 0.10) was significantly increased (p<0.01) in HFD group II when compared with normal group animals as shown in Table 5.9. The organs fat pad of sibutramine (5 mg/kg) treated group III shows significantly reduced (p<0.01) on heart (1.87 ± 0.09), kidney (1.18 ± 0.39), liver (1.59 ± 0.12) and uterus (1.45 ± 0.04) fat pad which was significantly reduced when compared with HFD group animals. The BDRE-treated (200 & 400 mg/kg) along with high fat diet groups V & VI animals significantly reduced (p<0.01 & p<0.05) organs fat pad of heart (1.89 ± 0.08, 1.98 ± 0.10), kidney (1.28 ± 0.74, 1.34 ± 0.71), liver (1.61 ± 0.14, 1.89 ± 0.16) and uterus (1.44 ± 0.04, 2.35 ± 0.13) when compared with HFD group animals. However, the BDRE-treated (100 mg/kg/day) along with high fat diet group animals did not show significant effect on different organ fat pad weight like heart, kidney, liver and uterine when compared with HFD group II animals.
5.1.3.2 Effects of Boerhavia diffusa extract on lipid profile in SD rats after 60 days of treatment

Table 5.10 shows that the HFD treated group II animals significantly increased (p<0.01) the TC (157.46 ± 2.87 mg/dl), LDL (85.54 ± 2.47 mg/dl), VLDL (18.02 ± 0.91 mg/dl) and TG (76.56 ± 1.74 mg/dl) levels as well as HDL (49.23 ± 3.30 mg/dl) level significantly decreased (p<0.01) when compared with normal group I animals. After the administration of sibutramine (5 mg/kg) group III supplemented with high fat diet the TC (126.41 ± 3.35 mg/dl), LDL (54.96 ± 1.92 mg/dl), VLDL (12.48 ± 0.25 mg/dl) and TG (58.77 ± 3.51 mg/dl) levels were significantly reduced (p<0.01) as well as HDL (79.23 ± 2.47 mg/dl) levels significantly (p<0.01) increased when compared with HFD group animals. The BDRE-treated (200 & 400 mg/kg) daily along with high fat diet group V & VI significantly reduced (p<0.01 & p<0.05) the TC (131.52 ± 3.70, 135.90 ± 1.61 mg/dl), LDL (55.18 ± 3.07, 56.02 ± 1.04 mg/dl), VLDL (9.52 ± 0.09, 10.07 ± 0.16 mg/dl) and TG (47.56 ± 0.84, 50.35 ± 0.81 mg/dl) levels when compared with HFD group II animals. The HDL effects of BDRE-treated group (200 & 400 mg/kg) daily significantly increased (p<0.01, p<0.05) (77.41 ± 3.53 and 69.27 ± 2.09 mg/dl) effects when compared with HFD group II animals. While BDRE-treated (100 mg/kg) daily along with high fat diet group the TC (145.51 ± 2.18), LDL (79.78 ± 3.48 mg/dl), VLDL (15.73 ± 0.36 mg/dl) and TG (71.47 ± 1.07 mg/dl) as well as HDL (53.97 ± 2.33 mg/dl) levels showed non significantly effects when compared with HFD group II animals.

5.1.3.3 Effects of Boerhavia diffusa on AST, ALT, BUN and creatinine levels in SD rats after 60 days of treatment

The HFD group II animals were significantly (p<0.01) increased the AST (117.46 ± 3.60 U/L) and ALT (59.25 ± 1.70 U/L) levels when compared with normal group I animals (Table 5.11). The sibutramine (5 mg/kg) supplemented with high fat diet treated group III animals AST and ALT levels were 81.91 ±
2.85 and 45.47 ± 1.23 U/L which was significantly reduced (p<0.01) when compared with group II animals. BDRE-treated (200 & 400 mg/kg) daily the AST (83.90 ± 2.37 & 87.52 ± 2.81 U/L) and ALT (48.39 ± 1.47 & 51.68 ± 1.38 U/L) levels were significantly reduced (p<0.01 & p<0.05) whereas the administration of BDRE (100 mg/kg) daily in group IV animals along with high fat diet the AST and ALT levels showed non significant effects when compared with HFD group II animals.

Table 5.12 revealed that BUN (53.05 ± 0.74 mg/dl) and creatinine (2.06 ± 0.16 mg/dl) levels were elevated in HFD group II animal when compared with normal group I animals. Sibutramine treated group III (5 mg/kg) along with high fat diet BUN (36.87 ± 0.49 mg/dl) and creatinine (1.01 ± 0.11 mg/dl) which was significantly reduced (p<0.01) when compared with HFD group II animals. The treatment with BDRE group at a dose of 200 & 400 mg/kg BUN (37.28 ± 0.47, 40.57 ± 0.68 mg/dl) and creatinine (1.06 ± 0.13, 1.41 ± 0.10 mg/dl) level significantly reduced (p<0.01, p<0.05) when compared with HFD group II animals whereas the BDRE treated 100 mg/kg the BUN and creatinine levels were showed non significant effects when compared with HFD group II animals.

5.1.4 Pharmacological studies for fractions

5.1.4.1 Effect of Boerhavia diffusa root fractions on body weight, food intake and organ fat pad weight in SD rats after 60 days of treatment

5.1.4.1.1 Body weight

Results are presented in Table 5.13, body weight of normal and HFD group II animals. The final body weight of HFD treated group II animals showed 320.00 ± 5.01 g which was significantly increased (p<0.01) in comparison to the group I animals. The body weight of sibutramine (5 mg/kg) treated group III was 226.76 ± 2.01 g which was significantly reduced (p<0.01) when compared with group II animals. In wt-F treated group VII animals (200 mg/kg) showed
significantly decrease in body weight (228.73 ± 4.17, p<0.01) when compared with group II animals. While the final body weight of Hx-F, chlo-F and n-butα-F treated (200 mg/kg) group IV, V and VI animals showed non significant effects when compared with group II animals. Administration of BDRE (200 mg/kg) & wt-F (200 mg/kg) was able to reduced the body weight (p<0.01) due to metabolic and 5HT pathway. It was found that the water fraction of B. diffusa extract shows greater significant reduction in body weight than BDRE.

Similarly % increase in body weight was found to be 135.09 (group II) when compared to 50.35 (group I) animal. Group II is highest among all which indicated that HFD animals gaining in the body weight and other groups were losing the % body weight 67.61 (group III), 20.75 (group IV), 26.31 (group V), 26.75 (group VI) and 65.95 (group VII) on treatment of different doses (Sibutramine 5 mg/kg) and BDRF (200 mg/kg) respectively when compare to HFD group II of animals.

5.1.4.1.2 Food intake

Food intake pattern of HFD diet fed and normal group I animals shown in Table 5.14. The food intake after 7 days in HFD group II significantly (p<0.01) increased from normal of 10.33 ± 1.80 to 14.83 ± 3.61. The food intake of sibutramine (5 mg/kg) treated group III animals was 11.50 ± 2.39 which was significantly reduced (p<0.01) when compared with group II animals. The wt-F of BDRE treated at a dose (200 mg/kg) group VII animal’s food intake 11.50 ± 2.43 showed significantly decreased (p<0.01) the consumption of food when compared with group II while Hx-F, chlo-F and n-butα-F treated (200 mg/kg) of group IV, V and VI animals showed non significant effects when compared with group II animals.

5.1.4.1.3 Organs fat pad weight

The organ fat pad weight of group II animals shows significantly increased (p<0.01) on heart (2.34 ± 0.14), kidney (1.59 ± 0.18), liver (2.76 ±
0.16) and uterine (2.80 ± 0.06) when compared with group I animals (Table 5.15). The organ fat pad weight of sibutramine (5 mg/kg) along with high fat diet treated group III animals shows significantly reduced (p<0.01) on heart (1.77 ± 0.14), kidney (1.19 ± 0.09), liver (1.67 ± 0.13) and uterine (1.54 ± 0.08) which were significantly reduced (p<0.01) when compared with group II animals. The wt-F treated (200 mg/kg) group VII animals of organs fat pad on heart (1.76 ± 0.09), kidney (1.21 ± 0.08), liver (1.62 ± 0.07) and uterine (1.56 ± 0.11) supplemented with high fat diet shows significantly reduced (p<0.01) when compared with group II animals whereas the organ fat pad of Hx-F, chlo-F and n-buta-F treated (200 mg/kg) of group IV, V and VI animals showed non significant effects when compared with group II animals.

5.1.4.2 Effects of Boerhavia diffusa fractions on lipid profile in SD rats after 60 days of treatment

Results depicted in Table 5.16 revealed that TC (162.17 ± 5.92 mg/dl), LDL (87.74 ± 9.59 mg/dl), VLDL (17.47 ± 1.19 mg/dl) and TG (81.41 ± 5.04 mg/dl) levels were significantly (p<0.01) elevated while HDL (42.94 ± 1.12) level was significantly decreased (p<0.01) in group II when compared with group I animals. The sibutramine (5 mg/kg) treated group III animals supplemented with high fat diet, TC (127.89 ± 3.75 mg/dl), LDL (56.49 ± 3.45 mg/dl), VLDL (10.84 ± 0.67 mg/dl) and TG (48.39 ± 3.77 mg/dl) were significantly reduced (p<0.01) as well as HDL (71.01 ± 4.81 mg/dl) level was significantly increased (p<0.01) when compared with group II animals. The wt-F treated group VII (200mg/kg) animals, levels of TC (133.17 ± 4.23 mg/dl), LDL (53.53 ± 4.75 mg/dl), VLDL (11.97 ± 1.18 mg/dl) and TG (55.02 ± 3.14 mg/dl) were significantly reduced (p<0.01) as well as HDL (74.64 ± 5.69 mg/dl) level showed significantly (p<0.01) increased when compared with group II. However, the administration of BDRE fraction like Hx-F, chlo-F and n-buta-F treated (200
mg/kg) of group IV, V and VI animals showed non significant effect on lipid profile (TC, LDL, VLDL, TG and HDL) when compared with group II animals.

5.1.4.3 Effects of Boerhavia diffusa root fractions on AST, ALT, BUN and creatinine levels in SD rats after 60 days of treatment

It was observed that the AST & ALT (119.52 ± 6.84 and 59.72 ± 4.41 U/L) levels of group II animals significantly increased (p<0.01) when compared with normal group I animals (Table 5.17). The sibutramine (5 mg/kg) treated group III animals AST and ALT (79.48 ± 3.08 & 38.68 ± 3.18 U/L) levels significantly reduced (p<0.01) when compared with group II animals. The treatment with wt-F in group VII (200 mg/kg) showed significantly decrease (p<0.01) in liver marker enzyme as AST and ALT (91.97 ± 4.73 & 39.61 ± 3.66 U/L) when compared with group II while the other fractions (200 mg/kg) like Hx-F, chl-F & n-buta-F the level of AST (85.29 ± 6.28, 89.12 ± 6.46, 81.71 ± 5.57 U/L) and ALT (47.64 ± 4.76, 45.98 ± 4.86, 49.36 ± 4.64 U/L) respectively showed non significant effects when compared with group II animals.

The BUN (56.84 ± 3.69 mg/dl) and creatinine (2.16 ± 1.13 mg/dl) levels of group II were showed significantly increased (p<0.01) when compared with group I shown in Table 5.18. The administration of sibutramine (5 mg/kg) along with high fat diet treated group III animals, BUN (37.67 ± 2.03 mg/dl) and creatinine (1.11 ± 0.17 mg/dl) which was significantly reduced (p<0.01) when compared with group II animals. The wt-F of BDRE (200 mg/kg) daily supplemented with high fat diet in group VII the BUN (39.49 ± 2.14 mg/dl) and creatinine (1.21 ± 0.19 mg/dl) levels significantly (p<0.01) decreased when compared with group II whereas the BDRE treated 100 mg/kg the BUN and creatinine levels were showed non significant effects when compared with when compared with group II.
5.1.5 Histopathological examinations

The histopathological examination hold up the results obtained from serum enzyme markers (figure 5.3).

**Liver**

Sample LA: animal revealed normal architecture

Sample LB: deposition of fatty material with abnormal nucleus.

Sample C: normal architecture with well-defined nucleus.

Sample LD: distributed architecture.

Sample LE: normal architecture with defined cell which is comparable to sample LA.

Sample LF: near to normal cell with little congestion in CV.

The histopathological examination hold up the results obtained from serum enzyme markers (figure 5.4).

**Kidney:**

Sample KA: animal revealed normal architecture

Sample KB: showed distributed architecture with enlarged nucleus.

Sample KC: normal architecture with well-defined nucleus.

Sample KD: distributed architecture.

Sample KE&KF: shows well arranged nucleus.
Table 5.7 Effects of *Boerhavia diffusa* root extract (BDRE) on body weight in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment groups</th>
<th>Initial body weight (g)</th>
<th>Final body weight (g)</th>
<th>% increase in body weight</th>
<th>% decrease in body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>134.17 ± 2.21</td>
<td>207.92 ± 5.42</td>
<td>54.96</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>135.00 ± 2.58</td>
<td>326.25 ± 8.96*</td>
<td>141.67</td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>136.67 ± 2.74</td>
<td>231.67 ± 6.49##</td>
<td>69.51</td>
<td>72.16</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>138.34 ± 3.33</td>
<td>284.26 ± 5.94ns</td>
<td>105.47</td>
<td>36.20</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>134.17 ± 3.01</td>
<td>242.34 ± 6.73##</td>
<td>80.62</td>
<td>61.05</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>136.67 ± 3.80</td>
<td>255.00 ± 7.36##</td>
<td>86.58</td>
<td>55.09</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 compared with respective normal group I.

P value = # <0.05, ## <0.01 compared with respective HFD group II.

ns= non significant compared with HFD group II.
**Table 5.8** Effects of *Boerhavia diffusa* root extract (BDRE) on food intake in SD rats during 7 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment groups</th>
<th>Initial day (g)</th>
<th>Final day (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 Day</td>
<td>7th Day</td>
</tr>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>8.87 ± 0.45</td>
<td>10.29 ± 1.12</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>8.19 ± 0.72</td>
<td>14.05 ± 2.30*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>10.6 ± 0.69</td>
<td>11.38 ± 1.29##</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>8.19 ± 0.72</td>
<td>13.14 ± 1.98ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>9.44 ± 0.63</td>
<td>11.86 ± 1.12##</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>8.19 ± 0.52</td>
<td>12.19 ± 1.43#</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 compared with respective normal control group I.
P value = #<0.05, ##<0.01 compared with respective HFD group II.
ns= non significant compared with HFD group II.
Table 5.9 Effects of *Boerhavia diffusa* root extract (BDRE) on visceral fat pad in SD rats after 60 days treatments.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment groups</th>
<th>Heart (g)</th>
<th>Kidney (g)</th>
<th>Liver (g)</th>
<th>Uterus (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>1.77 ± 0.06</td>
<td>1.16 ± 0.04</td>
<td>1.56 ± 0.11</td>
<td>1.45 ± 0.07</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>2.31 ± 0.09*</td>
<td>1.57 ± 1.23*</td>
<td>2.36 ± 0.13*</td>
<td>2.70 ± 0.10*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>1.87 ± 0.09##</td>
<td>1.18 ± 0.39##</td>
<td>1.59 ± 0.12##</td>
<td>1.45 ± 0.04##</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>2.04 ± 0.11ns</td>
<td>1.34 ± 0.15ns</td>
<td>1.96 ± 0.34ns</td>
<td>2.53 ± 0.11ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>1.89 ± 0.08##</td>
<td>1.28 ± 0.74##</td>
<td>1.61 ± 0.14##</td>
<td>1.44 ± 0.04##</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>1.98 ± 0.10#</td>
<td>1.34 ± 0.71#</td>
<td>1.89 ± 0.16#</td>
<td>2.35 ± 0.13#</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 compared with respective normal control group I.
P value = #<0.05, ##<0.01 compared with respective HFD group II.

ns= non significant compared with HFD group II.
Table 5.10 Effects of *Boerhavia diffusa* root extract (BDRE) on lipid profile in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>TC (mg/dl)</th>
<th>HDL (mg/dl)</th>
<th>LDL (mg/dl)</th>
<th>VLDL (mg/dl)</th>
<th>TG (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>124.84 ± 2.17</td>
<td>82.89 ± 3.05</td>
<td>53.29 ± 2.67</td>
<td>08.52 ± 0.09</td>
<td>47.56 ± 0.47</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>157.46 ± 2.87*</td>
<td>49.23 ± 3.30*</td>
<td>85.54 ± 2.47*</td>
<td>18.02 ± 0.91*</td>
<td>76.56 ± 1.74*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5mg/kg)</td>
<td>126.41±3.35##</td>
<td>79.23 ± 2.47##</td>
<td>54.96 ± 1.92##</td>
<td>12.48 ± 0.25##</td>
<td>58.77 ± 3.51##</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>145.51 ± 2.18ns</td>
<td>53.97 ± 2.33ns</td>
<td>79.78 ± 3.48ns</td>
<td>15.73 ± 0.36ns</td>
<td>71.47 ± 1.07ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>131.52 ± 3.70##</td>
<td>77.41 ± 3.53##</td>
<td>55.18 ± 3.07##</td>
<td>09.52 ± 0.09##</td>
<td>47.56 ± 0.84##</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>135.90 ± 1.61#</td>
<td>69.27 ± 2.09#</td>
<td>56.02 ± 1.04#</td>
<td>10.07 ± 0.16#</td>
<td>50.35 ± 0.81#</td>
</tr>
</tbody>
</table>

TC= Total cholesterol; HDL= High density lipoprotein; LDL= Low density lipoprotein; VLDL= Very low density lipoprotein; TG= Triglyceride.

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = * <0.01 compared with respective normal control group I.

P value = # <0.05, ## <0.01 compared with respective HFD group II.

ns= non significant compared with HFD group II.
Table 5.11 Effects of *Boerhavia diffusa* root extract (BDRE) on AST and ALT test in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>AST (U/L)</th>
<th>ALT (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>88.74 ± 2.13</td>
<td>33.59 ± 1.12</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>117.46 ± 3.60*</td>
<td>59.25 ± 1.70*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine</td>
<td>81.91 ± 2.85##</td>
<td>45.47 ± 1.23##</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>112.68 ± 3.33ns</td>
<td>54.68 ± 1.04ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>83.90 ± 2.37##</td>
<td>48.39 ± 1.47##</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>87.52 ± 2.81#</td>
<td>51.68 ± 1.38#</td>
</tr>
</tbody>
</table>

AST = Aspartat transaminase; ALT = Alanin transaminase.

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = * <0.01 compared with respective normal control group I.

P value = # <0.05, ## <0.01 compared with respective HFD group II.

ns = non significant compared with HFD group II.
**Table 5.12** Effects of *Boerhavia diffusa* root extract (BDRE) on BUN and creatinine in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>BUN (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>35.17 ± 0.68</td>
<td>0.81 ± 0.10</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>53.05 ± 0.74*</td>
<td>2.06 ± 0.16*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>36.87 ± 0.49##</td>
<td>1.01 ± 0.11##</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + BDRE (100 mg/kg)</td>
<td>50.36 ± 1.79ns</td>
<td>1.67 ± 0.02ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + BDRE (200 mg/kg)</td>
<td>37.28 ± 0.47##</td>
<td>1.06 ± 0.13##</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + BDRE (400 mg/kg)</td>
<td>40.57 ± 0.68#</td>
<td>1.41 ± 0.10#</td>
</tr>
</tbody>
</table>

BUN= Blood Urea Nitrogen

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 compared with respective normal control group I.

P value = # <0.05, ## <0.01 compared with respective HFD group II.

ns= non significant compared with HFD group II.
Table 5.13 Effects of *Boerhavia diffusa* root fractions (BDRF) on body weight in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>Initial body weight (g)</th>
<th>Final body weight (g)</th>
<th>% increase in body weight</th>
<th>% decrease in body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>135.30 ± 3.27</td>
<td>203.42 ± 2.24</td>
<td>50.35</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>136.12 ± 2.47</td>
<td>320.00 ± 5.01</td>
<td>135.09</td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>135.23 ± 2.39</td>
<td>226.67 ± 2.01 #</td>
<td>67.61</td>
<td>67.48</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>137.50 ± 1.71</td>
<td>294.27 ± 4.24 ns</td>
<td>114.01</td>
<td>21.08</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>137.50 ± 3.35</td>
<td>287.08 ± 4.67 ns</td>
<td>108.78</td>
<td>26.31</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>136.40 ± 1.54</td>
<td>284.17 ± 3.21 ns</td>
<td>108.34</td>
<td>26.75</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>135.23 ± 2.38</td>
<td>228.73 ± 4.17 #</td>
<td>69.14</td>
<td>65.95</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 showed significant compared with respective group I

P value = #<0.01 showed significant compared with respective group II

ns= non significant compared with respective group II.
Table 5.14 Effects of *Boerhavia diffusa* root fractions (BDRF) on food intake in SD rats after 7 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>Initial day (g)</th>
<th>Final day (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>9.67 ± 1.23</td>
<td>10.33 ± 1.80</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>8.17 ± 1.35</td>
<td>14.83 ± 3.61*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>10.83 ± 2.12</td>
<td>11.50 ± 2.39*</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>8.01 ± 1.29</td>
<td>13.67 ± 2.55ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>10.33 ± 1.43</td>
<td>13.17 ± 3.27ns</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>9.33 ± 1.28</td>
<td>13.33 ± 3.05ns</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>9.67 ± 1.75</td>
<td>11.50 ± 2.43#</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 showed significant compared with respective group I

P value = #<0.01 showed significant compared with respective group II

ns= non significant compared with respective group II
Table 5.15 Effects of *Boerhavia diffusa* root fractions (BDRF) on visceral fat pad in SD rats after 60 days treatments.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>Heart (g)</th>
<th>Kidney (g)</th>
<th>Liver (g)</th>
<th>Uterus (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>1.75 ± 0.11</td>
<td>1.17 ± 0.09</td>
<td>1.54 ± 0.09</td>
<td>1.49 ± 0.07</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>2.34 ± 0.14*</td>
<td>1.59 ± 0.18*</td>
<td>2.76 ± 0.16*</td>
<td>2.80 ± 0.06*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>1.77 ± 0.14#</td>
<td>1.19 ± 0.09#</td>
<td>1.67 ± 0.13#</td>
<td>1.54 ± 0.08#</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>2.22 ± 0.17ns</td>
<td>1.28 ± 0.11ns</td>
<td>2.61± 0.17ns</td>
<td>2.15 ± 0.10ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>2.12 ± 0.20ns</td>
<td>1.31 ± 0.12ns</td>
<td>2.49 ± 0.18ns</td>
<td>2.11± 0.11ns</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>2.29 ± 0.12ns</td>
<td>1.29 ± 0.04ns</td>
<td>2.71 ± 0.10ns</td>
<td>2.09 ± 0.13ns</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>1.76 ± 0.09#</td>
<td>1.21 ± 0.08#</td>
<td>1.62 ± 0.07#</td>
<td>1.56 ± 0.11#</td>
</tr>
</tbody>
</table>

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 showed significant compared with respective group I
P value = #0.01 showed significant compared with respective group II
ns= non significant compared with respective group II
Table 5.16 Effects of *Boerhavia diffusa* root fractions (BDRF) on lipid profile in SD rats after 60 days of treatment.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>TC (mg/dl)</th>
<th>HDL (mg/dl)</th>
<th>LDL (mg/dl)</th>
<th>VLDL (mg/dl)</th>
<th>TG (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>125.58 ± 3.45</td>
<td>78.18 ± 4.62</td>
<td>49.76 ± 5.34</td>
<td>09.25 ± 0.69</td>
<td>51.30 ± 3.44</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>162.17 ± 5.92*</td>
<td>42.94 ± 1.12*</td>
<td>87.74 ± 9.59*</td>
<td>17.47 ± 1.19*</td>
<td>81.41 ± 5.04*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>127.89 ± 3.75#</td>
<td>71.01 ± 4.81#</td>
<td>56.49 ± 3.45#</td>
<td>10.84 ± 0.67#</td>
<td>48.39 ± 3.77#</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>147.48 ± 4.73 ns</td>
<td>43.99 ± 3.75 ns</td>
<td>80.86 ± 7.85 ns</td>
<td>13.89 ± 1.10 ns</td>
<td>73.02 ± 4.84 ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>149.89 ± 4.50 ns</td>
<td>46.26 ± 6.48 ns</td>
<td>84.47 ± 7.91 ns</td>
<td>15.70 ± 1.02 ns</td>
<td>68.56 ± 4.60 ns</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>152.53 ± 5.43 ns</td>
<td>43.62 ± 2.56 ns</td>
<td>92.29 ± 8.09 ns</td>
<td>14.13 ± 1.15 ns</td>
<td>70.68 ± 4.77 ns</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>133.17 ± 4.23*</td>
<td>74.64 ± 5.69*</td>
<td>53.53 ± 4.75*</td>
<td>11.97 ± 1.18*</td>
<td>55.02 ± 3.14*</td>
</tr>
</tbody>
</table>

TC= Total cholesterol; HDL= High density lipoprotein; LDL= Low density lipoprotein; VLDL= Very low density lipoprotein; TG= Triglyceride.

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = * <0.01 showed significant compared with respective group I

P value = # <0.01 showed significant compared respective with group II

ns= non significant compared with respective group II
Table 5.17 Effects of *Boerhavia diffusa* root fractions (BDRF) on AST and ALT levels in SD rats after 60 days of treatment

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>AST (U/L)</th>
<th>ALT (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>86.48 ± 4.17</td>
<td>32.21 ± 3.15</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>119.52 ± 6.84*</td>
<td>59.72 ± 4.41*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>79.48 ± 3.08#</td>
<td>38.68 ± 3.18#</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>85.29 ± 6.28ns</td>
<td>47.64 ± 4.76ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>89.12 ± 6.46ns</td>
<td>45.98 ± 4.86ns</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>91.97 ± 4.73ns</td>
<td>49.36 ± 4.64ns</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>81.71 ± 5.57#</td>
<td>39.61 ± 3.66#</td>
</tr>
</tbody>
</table>

AST= Aspartate aminotransferase; ALT= Alanine pyrophosphate.

Data are expressed as Mean ± SEM of 6 rats in each group.

*P value = ^<0.01 showed significant compared with respective group I

*P value = ^#<0.01 showed significant compared with respective group II

ns= non significant compared with respective group II
Table 5.18 Effects of *Boerhavia diffusa* root fractions (BDRF) on BUN and creatinine in SD rats after 60 days of treatment

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatments</th>
<th>BUN (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal Control (NC)</td>
<td>37.78 ± 2.14</td>
<td>0.91 ± 0.12</td>
</tr>
<tr>
<td>II</td>
<td>High Fat Diet (HFD)</td>
<td>56.84 ± 3.69*</td>
<td>2.16 ± 1.13*</td>
</tr>
<tr>
<td>III</td>
<td>HFD + Sibutramine (5 mg/kg)</td>
<td>37.67 ± 2.03#</td>
<td>1.11 ± 0.17#</td>
</tr>
<tr>
<td>IV</td>
<td>HFD + Hx-F (200 mg/kg)</td>
<td>54.12 ± 3.70ns</td>
<td>1.82 ± 0.21ns</td>
</tr>
<tr>
<td>V</td>
<td>HFD + chlo-F (200 mg/kg)</td>
<td>49.19 ± 2.87ns</td>
<td>1.76 ± 0.20ns</td>
</tr>
<tr>
<td>VI</td>
<td>HFD + n-but-F (200 mg/kg)</td>
<td>47.98 ± 3.67ns</td>
<td>1.98 ± 1.03ns</td>
</tr>
<tr>
<td>VII</td>
<td>HFD + wt-F (200 mg/kg)</td>
<td>39.49 ± 2.14#</td>
<td>1.21 ± 0.19#</td>
</tr>
</tbody>
</table>

BUN = blood Urea Nitrogen

Data are expressed as Mean ± SEM of 6 rats in each group.

P value = *<0.01 showed significant compared with respective group I
P value = #<0.01 showed significant compared with respective group II

ns = non significant compared with respective group II
Figure 5.3: Liver

Sample LA: animal revealed normal architecture

Sample LB: deposition of fatty materiel with abnormal nucleus.

Sample LC: normal architecture with well define nucleus.

Sample LD: distributed architecture.

Sample LE: normal architecture with define cell which is comparable to sample LA.

Sample LF: near to normal cell with little congestion in CV.
Figure 5.4: Kidney:

Sample KA: animal revealed normal architecture.

Sample KB: showed distributed architecture with enlarged nucleus.

Sample KC: normal architecture with well define nucleus.

Sample KD: distributed architecture.

Sample KE&F: shows well arranged nucleus.