Anti-Diabetic And Hypolipidemic Effects Of Aqueous And Ethanolic Extracts Of Leptadenia Hastata On Streptozotocin-Induced Diabetic Albino Rats

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Abstract: The study was designed with the aim to validate scientifically the anti-diabetic and hypolipidemic potentials of Leptadenia hastata plant extract and supports its use as an alternative hypoglycemic agent. The study was conducted on 35 healthy male albino rats following experimentally induced-diabetes mellitus with streptozotocin. Oral administration of 150 mg/kg body weight, 300 mg/kg body weight aqueous extract and 150 mg/kg body weight, 300 mg/kg body weight ethanolic extracts were given to the diabetic rats for the period of 21 days. The fasting blood glucose was monitored at 7 days interval while lipid profile was assayed at the end of 21 days treatment also. The results reveals that oral administration of 300 mg/kg body weight ethanolic extract was found to be significant p<0.05 in lowering the blood glucose level (115.60 ± 3.82 mg/dl) as compared to the diabetic control group (420.80 ± 3.68 mg/dl). There was a significant p<0.05 improvement in weight of rat treated with 300mg/kg bwt (136.35±0.39 g) as compared to the diabetic control (108.55±2.10 g). The serum level of total cholesterol (188.34 ± 1.83 mg/dl), triglyceride (73.04 ± 1.94 mg/dl), high density lipoprotein (37.24±0.96 mg/dl) and low density lipoprotein (147.49 ± 2.37) were also significantly different p<0.05 as compared to diabetes control (235.69 ± 1.67 mg/dl), (181.23 ± 1.26 mg/dl), (16.03 ± 1.09 mg/dl), and (283.31 ± 1.69 mg/dl) respectively. The serum levels of high density lipoprotein (37.24±0.96 mg/dl) and low density lipoprotein (147.49 ± 2.37 mg/dl) were significantly different p<0.01 as compared to the standard drug control (35.93 ± 0.80 mg/dl) and (133.65 ± 1.51 mg/dl) respectively. Improvements in renal function were observed with urea (17.47 ± 0.36 mg/dl) and creatinine (0.61 ± 0.42 mg/dl) as compared with the diabetic control group (69.28 ± 1.89 mg/dl) and (3.31 ± 0.19 mg/dl) respectively. These results suggest that ethanolic extract Leptadenia hastata posses’s anti-diabetic and hypolipidemic potential following more than 14 days oral administration.

I. INTRODUCTION

Despite the enormous advances that have been made during the last decades in control, treatment and management of diabetes mellitus, it has continuously remained a serious health hazard worldwide with global prevalence of diabetes mellitus on the increase (Hu, 2003). The increase in prevalence has accelerated due to the our life style, aging population structure in the developed countries and due to the globally increasing obesity, as well as other contributing factor that may include some diseased conditions, dieting and genetic factors. According to Nash et al. (2001), diabetes mellitus is the sixth leading cause of death globally with International Diabetes Federation estimating that this number will grow to 11.5 million by 2025 unless measures are taken to control the disease (Hayat and Shaikh, 2010).

According to reports by World Health Organization (2009), the most common type of diabetes is type 2 diabetes as it accounts for 85 to 95% of all cases and constitutes the major and growing public health problem. Diabetes mellitus type 2, formerly non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency and sometimes ketoacidosis (Kumar et al., 2011).

II. MATERIALS AND METHOD

PLANT

Leptadenia hastata plant was collected from Kwanan Kuka Jimeta, along Yola Town Adamawa State and was authenticated by a Botanist at the Department of Plant Science Moddibo Adama University of Technology Yola.
EXPERIMENTAL ANIMALS

A total number of 35 male wister rats weighing between 90-110g were purchased from National Veterinary Research Institute, Vom, Nigeria. The animals were housed in a plastic cage and allowed to acclimatise and feed with standard diet and water ad libitum.

PLANT EXTRACTION

Fresh plant of *L. hastata* was allowed to dry at room temperature under shed. Dried plant was made into powder using mortar and pestle where 500g of the dried sample was extracted using water and 70% ethanol over 48 hours period. Each extract was then filtered using a filter paper (Whatmann No. 1) and concentrated using water bath at 50°C (Bello et al., 2011).

INDUCTION OF DIABETES

The experimental animals were fasted for 16 hours prior to the induction of diabetes. Streptozotocin was freshly prepared 10ml distilled water and was intraperitoneally injected to mice with a single dose of 60mg/kg. Random blood glucose was monitored for five (5) days, and the rats were fasted for 16h after the fifth day. Blood sample was collected from their tails for measurement of blood glucose. Rats with fasting blood glucose higher than 200mg/dl were considered diabetic once and were randomly divided into groups designed. (Jin-yin et al., 2012).

EXPERIMENTAL DESIGN

After the induction of diabetes mellitus, the rats, were randomly divided into experimental and control groups. Experimental animals were fasted for 16 hours before treatment and grouping will be done as follows:

- Group 1. Normal control (standard diet and water).
- Group 2. Positive control (diabetic + no treatment).
- Group 3. Positive + synthetic drug (metformin 5mg/kg b.w).
- Group4. Positive + water extract (150, 300mg/kg).
- Group 5. Positive + ethanol extract (150, 300mg/kg).

The animals in group 3, 4 and 5 were treated with various doses as indicated in the morning hours for the period of twenty one (21) days, while group 1 and 2 received no treatment. All the animals were on standard diet and water *ad libitum*. The rats were anaesthetized at the time of sacrifice by placing them in inhalation jar soaked with chloroform in sealed cotton wool. Blood was collected via cardiac puncture from each animal for the determination of fasting blood sugar and lipid profile (Cheesbrough, 1992 and Bello et al., 2011).

STATISTICAL ANALYSIS

Values obtained were expressed as mean ± SEM and data were analysed using Anova with multiple comparison versus control groups with the help of SPSS version 20. The values *p*<0.05 and *p* < 0.01 were considered significant (Duncan et al., 1977).

III. RESULTS AND DISCUSSION

The results in table 1 show the changes in body weight of experimental animals from day 1 to day 21. The table reveals that there is a significant increase (*p*<0.05) in the body weight of rats in normal group (158.62 ± 0.36) at the 21st day of experiment as compared to the weight of the rats at the 1st day (132.09 ± 0.72) of the experiment with 20.08% increase while in diabetes control group, the table shows that there is a significant decrease in the weight of the rats on the 21st day (108.55 ± 2.10) as compared to the weight measured on the 1st day before commencing the experiment (136.98 ± 0.76) with 10.32% decrease. There is also a significantly different *p*<0.05 in weight of the rats treated with ethanol extract 150 and 300 mg/kg body weight, 150 and 300 mg/kg body weight aqueous extract as compared to the diabetic control group and normal control group. The research findings revealed that there was a significant increase *p*<0.05 in the body weight of the rats in standard drug control group (metformin 5mg/kg body weight) (144.79 ± 2.60) at the end of 21st day as compared to the weight measured on the 1st day 131.24 ± 1.30 which has 10.32% weight difference. The value (144.79 ± 2.60) obtained in standard drug control group at 21st day was significantly different *p*<0.05 than groups treated with ethanol extract 150 and 300 mg/kg body weight, 150 and 300 mg/kg body weight aqueous extract respectively and significantly different *p*<0.05 as compared to the normal control group.

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>Day 1</th>
<th>Day 21</th>
<th>W.D (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>132.09 ± 0.72</td>
<td>158.62 ± 0.36*</td>
<td>20.08</td>
</tr>
<tr>
<td>Diabetes control</td>
<td>136.98 ± 0.76*</td>
<td>108.55 ± 2.10</td>
<td>-20.75</td>
</tr>
<tr>
<td>Diabetic + met. 5mg/kg-b.w</td>
<td>131.24 ± 1.30</td>
<td>144.79 ± 2.60*</td>
<td>10.32</td>
</tr>
<tr>
<td>Diabetic + 150mg/kg-b.w EE</td>
<td>134.20 ± 0.54*</td>
<td>126.17 ± 1.04</td>
<td>-5.98</td>
</tr>
<tr>
<td>Diabetic + 300mg/kg-b.w EE</td>
<td>135.60 ± 0.69</td>
<td>136.35 ± 0.39</td>
<td>0.55</td>
</tr>
<tr>
<td>Diabetic + 150mg/kg-b.w AE</td>
<td>134.77 ± 1.38*</td>
<td>122.06 ± 1.63</td>
<td>-9.43</td>
</tr>
<tr>
<td>Diabetic + 300mg/kg-b.w AE</td>
<td>137.20 ± 0.90</td>
<td>135.39 ± 1.80</td>
<td>-1.31</td>
</tr>
</tbody>
</table>

*Table 1: Effects of *Leptadenia hastata* treatments on body weight (g) in streptozotocin-induced diabetes and non-diabetic albino rats*

Values are expressed as mean ± SEM; *n*=5, b.w.-Body weight, EE- Ethanol extract, AE-aqueous extract, Met-metformin, W.D- weight difference.

Key: *a* significantly different than 1st day *p*<0.05

b significantly different than 21st day

Results obtained as shown in table 2 reveals a significant decrease *p*<0.05 in the levels of blood glucose of diabetes groups treated with various doses of *Leptadenia hastata* plant extract 150 mg/kg bwt Ethanolic extract (399.40 ± 8.44), 300 mg/kg bwt (326.40 ± 4.13) ethanolic extract, 150 mg/kg bwt (387.20 ± 3.64) aqueous extract, 300 mg/kg bwt (340.20 ± 2.94) and standard drug control group (312.00 ± 0.55) as compared to the diabetes control group (410.00 ± 1.92) on the 7th day of treatment.

However, the levels of blood glucose of the entire treatment group remains significantly increased *p*<0.05 compared to the normal control group (90.40 ± 1.63) but continues to decrease significantly as compared to the diabetic control group (440.00 ± 2.89) as revealed by the table on the 14th day of treatment. The findings as shown in the table further indicates a significant decrease *p*<0.01 in the blood glucose levels of the diabetes group treated with 300 mg/kg.
bwt ethanolic extract (147.60 ± 2.34) as compared to the standard drug control group (197.00 ± 1.30) on the 7th day treatment.

The results also shows that on the 21st day of treatment, there is a significantly decrease p<0.05 in the levels of blood glucose of groups receiving 150 mg/kg bwt and 300 mg/kg bwt ethanolic and aqueous extracts respectively as compared to the diabetes control group (420.80 ± 3.68) and as compared to the blood glucose levels of the treatment groups on the 7th and 14th day.

The study has revealed that group treated with 300 mg/kg bwt ethanolic extract (115.60 ± 3.82) has significantly decreased the level of blood glucose p<0.01 as compared to the standard drug control group (136.60 ± 0.68) on the 21st day of treatment.

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>0day</th>
<th>7days</th>
<th>14days</th>
<th>21days</th>
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</thead>
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<tr>
<td>Normal control</td>
<td>102.60 ± 2.71</td>
<td>90.40 ± 1.63</td>
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<td>95.20 ± 1.69</td>
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<td>Diabetes control</td>
<td>446.20 ± 0.28</td>
<td>410.00 ± 1.32</td>
<td>440.00 ± 2.89</td>
<td>420.80 ± 3.68</td>
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<tr>
<td>Diabetes + met. 5mg/kg-bwt</td>
<td>240.80 ± 5.65</td>
<td>312.00 ± 0.58*</td>
<td>197.00 ± 1.30*</td>
<td>136.60 ± 0.68*</td>
</tr>
<tr>
<td>Diabetes +150mg/kg-bwt EE</td>
<td>427.20 ± 5.89</td>
<td>399.40 ± 8.44*</td>
<td>200.00 ± 0.45*</td>
<td>141.40 ± 1.59*</td>
</tr>
<tr>
<td>Diabetes +150mg/kg-bwt AE</td>
<td>431.60 ± 6.64*</td>
<td>326.40 ± 4.13*</td>
<td>147.60 ± 2.34*</td>
<td>155.60 ± 3.82*</td>
</tr>
<tr>
<td>Diabetes +150mg/kg-bwt AE</td>
<td>416.20 ± 2.80</td>
<td>387.20 ± 3.64*</td>
<td>288.80 ± 6.39*</td>
<td>175.80 ± 1.59*</td>
</tr>
<tr>
<td>Diabetes +300mg/kg-bwt AE</td>
<td>428.00 ± 5.12</td>
<td>340.20 ± 2.94*</td>
<td>248.80 ± 2.08*</td>
<td>156.80 ± 1.77*</td>
</tr>
</tbody>
</table>

Table 2 Effects of Leptadenia hastata on blood glucose level (mg/dl) in streptozotocin-induced diabetes and non-diabetic albino rats

Values are expressed as mean ± SEM; n=5, bwt-Body weight, EE- Ethanol extract, AE-aqueous extract, Metformin (standard drug control)

Key: *Significantly different as compared with diabetic control p<0.05
** Significantly different as compared with standard drug control p<0.01

The results obtained in table 3 revealed a significant increase p<0.05 in serum total cholesterol in diabetes control group (335.69 ± 1.67) as compared to the normal control group (161.83 ± 2.13) and as compared with groups treated with standard drug control group (186.46 ± 1.87), diabetes group treated with 150mg/kg bwt (219.36 ± 0.47) and 300mg/kg bwt (188.34 ± 1.83) ethanolic extract and also significantly increased p<0.05 than diabetes group treated with 150mg/kg bwt (222.39 ± 0.82) and 300mg/kg bwt (205.52 ± 2.74) aqueous extract. The study findings has revealed that the level of serum cholesterol of standard drug control group (186.46 ± 1.87) is significantly p<0.01 decreased as compared with diabetes group treated with 150 mg/kg bwt ethanolic extract (219.36 ± 0.47), diabetes group treated with 150 mg/kg bwt (222.94 ± 0.82) aqueous extract and 300mg/kg bwt (205.52 ± 2.74) aqueous extract. The results as shown in the table revealed a significant increase p<0.05 in the level of serum triglycerides of diabetes control (181.23 ± 1.36) as compared with the normal control group (75.56 ± 1.03), standard drug control group (84.44 ± 3.99), group treated with 150mg/kg bwt (106.43 ± 1.99) and 300 mg/kg bwt (135.16 ± 1.69) aqueous extracts. The table further reveals a significant increase p<0.01 in serum level of triglyceride of group treated with 150mg/kg bwt (106.43 ± 1.99) ethanolic extract, 150 mg/kg bwt (164.93 ± 0.97) and 300 mg/kg bwt (135.16 ± 1.69) aqueous extracts as compared to the standard drug control group (84.44 ± 3.99). Results from the table further revealed a significant decrease p<0.05 in the level of serum triglycerides of diabetes group treated with 300 mg/kg bwt ethanolic extract (73.04 ± 1.94) as compared to the diabetic control group (181.23 ± 1.26).

The study findings as indicated in the table revealed a significant decrease p<0.05 in the level of serum high density lipoprotein (HDL) of diabetes control group (16.03 ± 1.09) as compared to the normal control group (46.73 ± 1.03) and significantly decreased p<0.05 as compared to all the treatment group. The table shows the most significant improvements in the level of serum HDL of standard drug control group (35.93 ± 0.81) and group treated with 300 mg/kg bwt (37.24 ± 0.96) ethanol extract as compared to the normal control group (46.73 ± 1.03). The table shows that there is a significantly high increase p<0.01 in the level of serum low density lipoprotein (LDL) in diabetes control group (283.31 ± 1.69) as compared to the normal control group (99.96 ± 2.54) and as compared to all the treatment groups. The table indicated a significant decrease p<0.01 in the level of LDL in standard drug control group (133.65 ± 1.51) as compared to treatment groups.

The results from table 4 shows that there is a significant increase p<0.05 in the level of serum urea of diabetes control group (69.28 ± 1.89) as compared to the groups treated with 150 mg/kg body weight (35.12 ± 0.87), group treated with 300mg/kg body weight (17.47 ± 0.38) ethanolic extracts and also significantly increased p<0.05 as compared to the groups treated with 150 mg/kg body weight (63.70 ± 1.18) and 300 mg/kg body weight (54.69 ± 1.82) aqueous extracts. The table reveals that there was no significant difference p<0.05 in the level of serum urea between normal control group (18.87 ± 0.36) and standard drug control group (20.57 ± 1.14) but there was a significant difference between the standard drug control group and groups treated with 300mg/kg body weight p<0.01 (17.47 ± 0.38), 300 mg/kg body weight ethanolic extracts.

The values from this research work as revealed in the table shows that there is a significant increase p<0.05 in serum level of creatinine in diabetes control group (3.31 ± 0.19) as compared to normal control group (0.66 ± 0.02), standard control group (0.64 ± 0.04), group treated with 150 (0.80 ± 0.03) and 300 mg/kg body weight (0.61 ± 0.42) ethanolic extracts and also with groups treated with 150 (1.14 ± 0.17) and 300 mg/kg body weight (0.84 ± 0.02) aqueous extracts. The table shows no significant difference p<0.05 between normal control group (0.66 ± 0.02) and standard drug control group (0.64 ± 0.04) but there is a significant difference p<0.01 in group treated with 300mg/kg body weight ethanolic extract (0.61 ± 0.42) as compared with the standard drug control group (0.64 ± 0.04). The table further revealed that there is a significant difference p<0.05 between 150 (0.80 ± 0.03) and 300 mg/kg body weight (0.61 ± 0.42).
**Table 3: Effects of Leptadenia hastata on lipid profile (mg/dl) in streptozotocin-induced diabetes and non-diabetic albino rats**

Values are expressed as mean ± SEM; n=5, bwt-Body weight, T.chol- Total cholesterol, HDL-High density lipoprotein, EE- Ethanol extract, TG- triglyceride, AE-aqueous extracts, Met- metformin (standard drug), LDL-low density lipoprotein

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>Urea (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>18.87 ± 0.36</td>
<td>0.66 ± 0.02</td>
</tr>
<tr>
<td>Diabetes control</td>
<td>69.28 ± 1.89</td>
<td>3.31 ± 0.19</td>
</tr>
<tr>
<td>Diabetic +5mg/kg-bwt</td>
<td>20.57 ± 1.14a</td>
<td>0.64 ± 0.04a</td>
</tr>
<tr>
<td>Diabetic +150mg/kg-bwt EE</td>
<td>35.12 ± 0.87a</td>
<td>0.80 ± 0.03a</td>
</tr>
<tr>
<td>Diabetic +300mg/kg-bwt EE</td>
<td>17.47 ± 0.86a</td>
<td>0.61 ± 0.42a</td>
</tr>
<tr>
<td>Diabetic +150mg/kg-bwt AE</td>
<td>63.70 ± 1.81a</td>
<td>1.14 ± 0.17a</td>
</tr>
<tr>
<td>Diabetic +300mg/kg-bwt AE</td>
<td>54.68 ± 1.82a</td>
<td>0.84 ± 0.02a</td>
</tr>
</tbody>
</table>

Key: *a* significantly different as compared with diabetes control group p<0.05
*b* significantly different as compared with standard drug control group p<0.01

**Table 4: Effects of Leptadenia hastata on kidney function in streptozotocin-induced diabetes and non-diabetic albino rats**

Values are expressed as mean ± SEM (n=5), bwt-Body weight, EE- Ethanol extract, AE-aqueous extract, Met-metformin (standard drug control)

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>Urea (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>0.61 ± 0.42</td>
<td>0.66 ± 0.02</td>
</tr>
<tr>
<td>Diabetes control</td>
<td>0.80 ± 0.03</td>
<td>1.14 ± 0.17</td>
</tr>
<tr>
<td>Diabetic +5mg/kg-bwt</td>
<td>0.84 ± 0.02</td>
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<tr>
<td>Diabetic +150mg/kg-bwt EE</td>
<td>1.14 ± 0.17</td>
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<td>Diabetic +300mg/kg-bwt EE</td>
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<td>Diabetic +300mg/kg-bwt AE</td>
<td>0.84 ± 0.02</td>
<td></td>
</tr>
</tbody>
</table>

Key: *a* significantly different as compared to diabetic control group p<0.05
*b* significantly different as compared to standard drug control group p<0.01

**IV. DISCUSSION**

When studying a chronic disease such as diabetes, it is more relevant to test the maintenance of lower blood glucose level with long-term treatment rather than the acute hypoglycemic effect after a single administration. In this study, it was found that repeated administration of Leptadenia hastata extracts continually decreases blood glucose level in diabetic albino rats after induction of hyperglycemia with 60 mg/kg body weight streptozotocin.

Animal induced model of diabetes has provided considerable approach and clear knowledge about the physiologic and biochemical derangement of the diabetic state and have demonstrated that intra-venous injection of 60 mg/kg dose of streptozotocin in adult albino rats, makes pancreas swell and causes degeneration in langerhans islet beta cells. Streptozotocin selectively destroys the pancreatic insulin secreting β –cells and induces experimental diabetes mellitus in 24 hours (Elolebo and Ahmed, 2015).

This high increase (hyperglycemia) in blood glucose of all the experimental animals was monitored for about 5 days before commencing treatment with doses designed for the research in which the increase in blood glucose was observed to be significantly high and stable for over 120 hours and this explains why streptozotocin is relatively toxic to beta cells, since these cells have relatively high levels of GLUT2 as explained by Ali and Agha, (2009). Since streptozotocin-induced diabetes is accompanied by insulin resistance, Leptadenia hastata plant extract improved insulin sensitivity. It was reported that a traditional herbal medicine improved insulin action in streptozotocin-induced diabetic mice via enhancing insulin signalling (Prakash et al., 2015).

An important symptoms of diabetes mellitus which can be physically examine is the lost of body weight, fatigue and weakness that may be caused by muscle wasting from the catabolic state of insulin deficiency, hypovolemia, and hypokalemia (Gnanou et al., 2015). This research has demonstrated that the plant extract has helped in body weight recovery of the diabetic groups treated with various doses of the extracts as compared to the diabetic control group. This recovery in body weight was supported by a similar studies carried out by (Elahesh et al., 2015).

The study has demonstrated a significant decrease in the blood glucose levels of the diabetes group treated with both ethanolic and aqueous extract at the end of 21 days treatment. However, there was a higher significant decrease in group with 300 mg/kg body weight ethanolic extract on the 14th day as compared to the standard drug and diabetic control groups on the 14th day treatment and on the 21st day of treatment. This has suggested that the dose 300 mg/kg body weight ethanolic extract is more effective in treatment of streptozotocin-induced diabetes mellitus in rat mode than all other dose of aqueous and ethanolic extracts. This decrease in blood glucose could be attributed to the presence of anti-diabetic bioactive components of the plant and this suggests that plant extract may have produce an effect similar to that of metformin mechanism, and thus could serve as good adjuvant to other oral hypoglycemic agents and seems to be promising for the development of phytomedicines for diabetes mellitus as reported in a similar studies by (Ahmed et al., 2015).

Proper assertion of diabetic derangements does not depends on blood glucose assessment only but also on other biochemical parameters that are associated with defective metabolism of carbohydrate and other underlying contributing factors to the development of the disease (World Health Organization, 2009).

The study has demonstrated that there is an improvement in lipid profile of the treated groups as compared to the diabetic control group. These improvements have been further supported as demonstrated in a similar research by Govindappa, (2015). Clinical significance of determining serum total cholesterol cannot be over emphasized, because cholesterol is the main lipid found in the blood, bile and brain tissues. It is also the most important steroid of the body and is a precursor of many steroid hormones (Adaramoye, and Adeyemi, 2006). The liver metabolises the cholesterol and transport in the blood stream by the lipoprotein. Increased levels of serum cholesterol indicates hypercholesterolemia, hyperlipidemia, hypothyroidism, uncontrolled diabetes, and nephritic syndrom and cirrhosis while decreased level is indication of malabsorption, malnutrition, hyperthyroidism, anaemia and liver disease (Wang et al., 2010).

Clinical significance of triglycerides is also very important as they are simple lipids formed in the liver by glycerol and fatty acids. They are transported by VLDL, LDL and constitute about 95% of fats stores as energy in the tissue and plasma. Therefore, increased levels are indication of
hyperlipidemias, diabetes, nephritic syndrome, and hypothyroidism. Decreased levels are found in malnutrition and hyperthyroidism (Manning et al., 1998).

Apart from hyperglycemia observed from testing blood glucose in diabetes mellitus, renal function test is very important in diagnosis and treatment of diabetes. In this study, there was a significant improvement in the serum level of creatinine and urea in the treated groups as compared to the diabetic control group. Serum urea and creatinine level are test of renal function. The formation of creatinine is constant, and has a direct relationship to muscle mass. For this reason, creatinine varies with age, sex and disease condition especially affecting the kidney function such as chronic diabetic condition and since one of the symptoms of diabetes mellitus is unexplained weight lost, it is of importance to check the level of creatinine to monitor the level of progress in treatment (Yoshinari et al., 2009).

V. CONCLUSION

Treating diabetes mellitus with plant derived compounds which are accessible and do not require laborious pharmaceutical synthesis seems highly attractive because, therapies developed along the principles of western medicine (synthetic drugs) are often limited in efficacy, associated adverse effects, and are often too costly, especially for the developing world.

It is therefore reasonable to suggest that the results clearly demonstrate that long term administration Leptadenia hastata plant extracts provides beneficial hypoglycemic, hypolipidemic effects on the damaged organs associated with diabetes mellitus especially in streptozotocin-induced diabetes in albino rats. These findings represent an experimental confirmation of the traditional use of Leptadenia hastata plant extract for diabetic treatment.

However, knowledge on the specific modes of action of plant extracts in the treatment of diabetes is not fully understood, but studies have shown that most of the plants have been found to contain substances like glycosides, alkaloids, terpenoids and flavonoid that are frequently implicated as having anti-diabetic effects (Dambatta and Aliyu (2011).

In this regard, this study has validated the claims reported about the hypoglycemic efficacy of Leptadenia hastata plant extract. This evidence may be useful to the health professionals, scientists and scholars working the field of pharmacology and therapeutics to develop evidence-based alternative medicine to cure different kinds of diabetes in man and animal induced model.

REFERENCES


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