ABSTRACT
Diabetes has become a common global health problem that affects >170 million people worldwide. It is one of the leading causes of death and disability. T2D has become an epidemic in the 21st century where India leads the world with largest number of diabetic subjects. The present study was planned to evaluate the antidiabetic activity of cucurbita pepo, Corallocarpus epigaeus and their formulation in streptozotocin induced diabetic experimental rats. From this the new information about the plant possessing antibiotic activity may be delivered which may be used for the future studies in the drug discovery and development. Wistar albino rats of either sex, 8 to 10 weeks old, weighing about 180-200gm were used in experiments. Filtrate extract of cucurbita pepo and corallocarpus epigaeus was used for various phytochemical screening. The acute toxicity for aqueous extract of fruit of cucurbita pepo, ethanolic extract of tuberous root of corallocarpus epigaeus and their formulation were determined. The rats was made diabetic by an intra-peritoneal (i.p) injection of streptozotocin at a dose 60mg/kg b.w. Assessment of blood glucose levels, total cholesterol, total triglyceride, HDL, LDL, VLDL, SGPT, SGOT, Serum urea, serum creatinine levels were done. In glucose tolerance test, the glucose levels were estimated before drug treatment and at different intervals thereafter. Administration of extracts in separate manner decreased the blood glucose level to near normal control but
treatment with composite extract formulation showed better decrease in blood glucose level. In case of serum lipid profile, it was observed that there was an increase in serum total cholesterol, serum total glyceride, LDL, VLDL, SGPT, SGOT, Serum urea and serum creatinine whereas a decrease in HDL levels in diabetic rats. After 21 days continuous administration of aqueous extract of fruit of cucurbita pepo (200mg/kg b.w p.o), ethanolic extract of tuberous root of corallocarpus epigaeus (50mg/kg b.w p.o), their formulation (100mg/kg b.w p.o) in diabetic rats led to significant decrease in serum total cholesterol, serum total glyceride, LDL, VLDL, SGPT, SGOT, Serum urea and serum creatinine levels in diabetic rats, while HDL levels were increased. Recovery was better in the composite extract than the individual extract treated group. The present study indicates that the aqueous fruit extract of cucurbita pepo, ethanolic extract tuberous root of corallocarpus epigaeus and their formulation possess the anti diabetic activity. Formulation was found to be more effective than aqueous fruit of Cucurbita pepo and ethanolic extract of tuberous root of corallocarpus epigaeus administered alone.

**KEYWORDS:** Diabetes mellitus, Corallocarpus epigaeus, cucurbita pepo, streptozotocin, extracts, blood glucose.

1. INTRODUCTION
Diabetes has become a common global health problem that affects >170 million people worldwide. It is one of the leading causes of death and disability. It is estimated that by 2030, the number will rise to 366 million (www.who.int). The majority of diabetes (~90%) is type 2 diabetes (T2D) caused by a combination of impaired insulin secretion from pancreatic beta cells and insulin resistance of the peripheral target tissues, especially muscle and liver. According to Wild et al. (2004) the ‘top’ three countries in terms of the number of T2D individuals with diabetes are India (31.7 million in 2000; 79.4 million in 2030), China (20.8 million in 2000; 42.3 million in 2030); and the US (17.7 million in 2000; 30.3 million in 2030). Clearly, T2D has become an epidemic in the 21st century where India leads the world with largest number of diabetic subjects. In diabetic individuals the regulation of glucose levels by insulin is defective, either due to defective insulin production which is called as Insulin Dependent Diabetes Mellitus (IDDM) or due to insulin resistance that is termed as Non Insulin Dependent Diabetes Mellitus (NIDDM).

Diabetes mellitus is a dreadful disease found in parts of the world and is becoming a serious threat to mankind health. There are lots of chemical agents available to control and to treat
diabetic patients, but total recovery from diabetes has not been reported up to this date. Alternative to these synthetic agents, plants provide a potential source of hypoglycemic drugs and are widely used in several traditional systems of medicine to prevent diabetes. So the scope of the present plants Cucurbita pepo and Corallocarpus epigaeus to possess the antidiabetic activity is here.

Thus the present study was planned to evaluate the antidiabetic activity of cucurbita pepo, Corallocarpus epigaeus and their formulation in experimental rats. From this the new information about the plant possessing antibiotic activity may be delivered which may be used for the future studies in the drug discovery and development.

2. Aims and objectives
The aim of the present study was to evaluate the antidiabetic activity of aqueous extract of fruit of cucurbita pepo, ethanolic extract of tuberous root of Corallocarpus epigaeus and their formulation in streptozotocin induced diabetes rats.

2.1 Objectives
The objectives of the present study were

- Collection and authentication of fruits of cucurbita pepo and tuberous root of corallocarpus epigaeus.
- Preparation of aqueous extract of cucurbita pepo by maceration method, 90% ethanolic extract of tubers root of corallocarpus epigaeus by soxhlet apparatus and their formulation (1:1) ratio of aqueous extract of fruit of cucurbita pepo and methanolic of tuberous root of corallocarpus epigaeus.
- Evaluation of preliminary phytochemical screening.
- Acute toxicity study (O.E.C.D. guideline 423) of aqueous fruit extract of cucurbita pepo, ethanolic extract of tuberous root of corallocarpus epigaeus and their formulation.
- Oral glucose tolerance test.
- Evaluation of antidiabetic activity of aqueous fruit of cucurbita pepo, ethanolic extract of tuberous root of corallocarpus epigaeus and formulation by induction of diabetes with streptozotocin.
- Assessment of blood glucose levels, total cholesterol, total triglyceride, HDL, LDL, VLDL, SGPT, SGOT, Serum urea, serum creatinine levels.
3. MATERIALS AND METHODS

3.1 Collection and authentication of plants: The fresh fruits of cucurbita pepo as well tuberous roots of corallocarpus epigaeus were collected from Herbal garden (Ibn-e-baitar) CRIUM,Hyderabad,Andhra Pradesh, India in the month of march 2013 and authenticated by Dr. M.A.Waheed, Director, CRIUM.

The whole plant was cleaned, air dried and grounded into powdered separately. The dried powdered plants material were passed through sieve No. 60 and stored in the air tight containers.

3.2 Animals: Wistar albino rats of either sex, 8 to 10 weeks old, weighing about 180-200gm were used in experiments. Animals were housed in polypropylene cages maintained under standard environmental conditions (at 12 hrs light/dark cycle; 25±3°C) and had free access to standard rat feed and water. All animals were acclimatized to laboratory conditions for a week before commencement of experiment.

3.3 Preparation of formulation of cucurbita pepo and corallocarpus epigaeus

The extracts of cucurbita pepo and corallocarpus epigaeus were prepared were mixed in 1:1 proportions. Further the concentrated extract was dried in dessicator and stored in vacuum sealed air tight containers. The powder was coarsely crushed. The extract was suspended in 0.9% w/v normal saline as a vehicle solution and was used.

3.4 Preliminary phytochemical screening: Phytochemical tests were performed by dissolving 200 mg of extracted material in 10 ml of distilled water and filtered. This filtrate extract was used for various phytochemical screening.

3.4.1 Test for Alkanoids: Dragendroff’s test,Mayer’s test, Hager’s test,Wagner’s test was performed which confirms the presence of alkanoids.

3.4.2 Test for carbohydrates: Molish’s test,Fehling’s test, Benedict’s test confirms the presence of carbohydrates and reduced sugars.

Test for Flavonoids: Shinoda test, alkaline reagent test indicates the presence of flavonoids.

Test for proteins: Biuret test, xanthoproteic test , trichloroacetic acid test indicated the presence of proteins.
Test for steroids and triterpenoids: Liebermann test, Salkowski test, Sulfur test indicates the presence of steroids and triterpenoids.

Test for Amino acids: Million’s test, Ninhydrin test indicated the presence of aminoacids.

Test for Tannins: Ferric chloride test, bromine water test indicates the presence of tannins.

Test for fixed oils and fats: Spot test, saponification test indicates the presence of fixed oils and fats.

Test for saponins: Forth formation tests, hemolytic test, indicates the presence of saponins.

Test for Glycosides: Borntrager’s test indicates the presence of anthraquinone glycoside, Baljet’s test and keller-killani test indicates the presence of cardiac glycoside and picric acid test indicates the presence of cynogenetic glycosides.

3.5 Acute toxicity studies (O.E.C.D. GUIDELINE 423)
The acute toxicity for aqueous extract of fruit of cucurbita pepo, ethanolic extract of tuberous root of corallocarpus epigaeus and their formulation were determined. The animals were fasted prior to the dosing, food but not water and were withheld overnight. Following the period of the fasting, the animals were weighed and test substance was administered. After the substance was administered, food was withheld for a further 3-4 hrs. Fixed dose method was adopted as per O.E.C.D. Guideline No. 423: (Annexure-2) of CPCSEA.[6,7]

Three animals were used for each step. The dose level of extract and formulation to be used as the starting dose was selected from one of the four fixed levels 50, 500, 1000, 2000 mg/kg b.w. p.o. The starting dose level was most likely to produce mortality in some of the dosed animals.

After administration of test sample, the animals were observed continuously for first 4 hrs for behavioral, neurological and autonomic profile changes and the end of 24hrs for mortality rate during the acute toxicity studies.[8]

The therapeutic dose of the drug was considered as 1/10th of effective dose.[9]

3.6 Glucose Tolerance Test
Animals were fasted for 24 hours before experimentation but allowed free access to water. Fast rats were divided into 4 groups of six rats each.
Group 1- Normal control rats received normal saline (0.9% w/v) at the rate of 5 ml/kg b.w.p.o.

Group 2- Received the aqueous fruit extract of cucurbita pepo (200mg/kg b.w) with normal saline (0.9% w/v) at the rate of 5 ml/kg b.w.p.o.

Group 3- Received the ethanolic extract tuberous root of corallocarpus epigaeus (50mg/kg b.w) with normal saline (0.9% w/v) at the rate of 5 ml/kg b.w.p.o.

Group 4-Received the formulation (100mg/kg b.w) with normal saline (0.9 w/v) at the rate of 5ml/kg b.w p.o.

The rats of all groups glucose was given (2 g/kg body weight, per orally) 30 min after administration of the drug. Blood samples were collected from the tail vein just prior to glucose administration and at 30, 90 and 150 min after the glucose loading.\cite{10,11,12}

The amount of blood glucose was determined by Accu-chek sensor glucometer.\cite{13,14}

3.7 Effect of extracts and formulation on streptozotocin induced diabetes in rats

The study include 36 wistar rats (180-200g b.w) of either sex were used among which 6 animals were separated to serve as normal control group. The basal concentration of blood glucose of all the animals were recorded.

Animals weighing (180-200g b.w) were fasted for 24 hours and were made diabetic by an intra-peritoneal (i.p) injection of streptozotocin at a dose 60mg/kg b.w, freshly prepared ice cold citrate buffer (PH 4.5) in 0.9% w/v normal saline. The rats were maintained on 5% w/v glucose solution for the next 24 hours to treat hypoglycemia.\cite{15,16}

4. RESULTS

Table 1: Preliminary Qualitative Phytochemical testing of extracts

<table>
<thead>
<tr>
<th>S. no</th>
<th>Test /extracts</th>
<th>Cucurbita pepo</th>
<th>Corallocarpus epigaeus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dragendroff’s test</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Mayer’s test</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Hager’s test</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Wagner’s test</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1</td>
<td>Molish’s test</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Fehling’s test</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Benedict’s test</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Flavonoids
1  Shinoda’s test  +  +
2  Alkaline reagent test  +  +

Proteins
1  Biuret’s test  +  -
2  Xanthoproteic test  +  -
3  Trichloroacetic acid test  +  -

Steroids and triterpenoids
1  Liebermann-burchand test  +  +
2  Salkowski  +  +

Amino acids
1  Million’s test  +  +
2  Ninhydrin test  +  +

Tannins
1  Ferric chloride test  +  -
2  Bromine water test  +  -

Fixed oils and fats
1  Spot test  +  -
2  Saponification test  +  -

Saponins
1  Forth formation test  +  -
2  Hemolytic test  +  -

Glycosides
1  Baljet’s test  +  -
2  Keller-Killani test  +  -

‘+’ indicates the presence of compound; ‘-’ indicates the absence of compounds.

4.1 Glucose tolerance test

In glucose tolerance test, the glucose levels were estimated before drug treatment and at different intervals thereafter. In the control group the blood glucose was found to increase linearly from basal value of 79.66 mg/dl to 165.3 mg/dl in the first 30 minutes. After 60 minutes of glucose loading, the blood glucose was increased further. The maximum value of 253.3 mg/dl was seen at the 90 minutes.

Whereas in the extracts and formulation treated animals, only a little elevations was seen in the blood glucose at 150 minutes and maximum glucose tolerance was observed at 90 minutes in aqueous extract of Cucurbita pepo (200 mg/kg b.w p.o) showed 83.5 mg/dl, etanolic extract of tuberous root of corallocarpus epigaeus (50 mg/kg b.w p.o) treated rats showed 82.8 mg/dl, and their formulation (100 mg/kg b.w p.o) treated rats showed 81 mg/dl. The results have been tabulated in the Table 2.
Table 2. Blood Glucose Levels (mg/dl)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 min</th>
<th>30 min</th>
<th>90 min</th>
<th>150 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>79.66±6.29</td>
<td>165.33±5.02</td>
<td>253.33±5.01</td>
<td>192.83±8.69</td>
</tr>
<tr>
<td>Cucurbita pepo (200mg/kg)</td>
<td>94±9.35</td>
<td>104.84±7.89</td>
<td>83.50±6.73</td>
<td>93.34±7.08</td>
</tr>
<tr>
<td>Corallocarpus epigaeus (50mg/kg)</td>
<td>84.66±8.99</td>
<td>107.83±9.36</td>
<td>82.83±9.10</td>
<td>95.33±9.10</td>
</tr>
<tr>
<td>Formulation (100mg/kg)</td>
<td>77.67±6.43</td>
<td>103.34±8.41</td>
<td>81±4.06</td>
<td>88.50±4.74</td>
</tr>
</tbody>
</table>

4.2 Blood glucose levels Effect of extracts and formulation on streptozotocin induced Diabets rats (1st, 7th, 14th, and 21st Day)

Table 3 shows that to the extract administration, there was no significant difference between the blood glucose levels of the five diabetic groups of animals on first day. However, after 21 days the blood glucose levels of the extracts, formulation and glibenclamide treated rats were significantly lowered than the diabetic control. Blood glucose levels results for aqueous fruit extract of cucurbita pepo, ethanolic extract of tuberous root of corallocarpus epigaeus and formulation showed 81mg/dl, 104.34mg/dl and 72.5mg/dl respectively. The blood glucose level study for above mentioned treated rats were significantly lower as compared to diabetic control rats (414.6 mg/dl) on 21st day. Administration of cucurbita pepo and corallocarpus epigaeus in separate manner decreased the blood glucose levels to near control but treatment with composite extract formulation shows better decrease in blood glucose level when compared with separate administration. In contrast the blood glucose level of diabetic control rats remained elevated and for healthy (control group) remained unchanged throughout the experimental period.

Table 3: Effect of extracts and formulation of blood glucose levels (md/dl) in diabetes rats.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1st day</th>
<th>7th day</th>
<th>14th day</th>
<th>21st day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>98.5±1.63</td>
<td>96.16±2.26</td>
<td>90.5±3.13</td>
<td>97.17±2.18</td>
</tr>
<tr>
<td>Diabetic control</td>
<td>356.83±4.53</td>
<td>371.5±6.98</td>
<td>394.16±5.14</td>
<td>414.67±5.80</td>
</tr>
<tr>
<td>Cucurbita pepo (200mg/kg)</td>
<td>354.5±2.75</td>
<td>259.33±7.91</td>
<td>157.33±2.01</td>
<td>81±2.06</td>
</tr>
<tr>
<td>Coralocarpus epigaeus (50 mg/kg)</td>
<td>357±1.75</td>
<td>261.83±8.16</td>
<td>161.84±1.99</td>
<td>104.34±1.78</td>
</tr>
<tr>
<td>Formulation (100mg/kg)</td>
<td>351.67±1.82</td>
<td>250.5±7.49</td>
<td>150.5±2.48</td>
<td>72.5±2.11</td>
</tr>
<tr>
<td>Glibenclamide (5mg/kg)</td>
<td>353.84±1.74</td>
<td>243.5±7.96</td>
<td>143.5±1.47</td>
<td>70.17±1.40</td>
</tr>
</tbody>
</table>
4.3 Biochemical estimation after 21 days treatment

Effect of extracts and formulations on TC and TG in diabetic rats

It was observed that there was an increase in serum total cholesterol (241.2mg/dl) and serum total triglyceride (135.8mg/dl) levels in diabetic control compared to normal control rats. However after 21st days continuous administration of aqueous extract of fruit of cucurbita pepo (200mg/kg b.w p.o), ethanolic extract of tuberous root of corallocarpus epigaeus (50mg/kg b.w p.o), their formulation (100mg/kg b.w p.o) by orally for 21 days, there was significant fall in serum total cholesterol (165.2,176.6,162.6 mg/dl) and serum triglycerides (66.2,70.9,63.1 mg/dl) levels compared to diabetic control rats, respectively shown in table 4.

4.4 Effect of extracts and formulation on HDL, VLDL and LDL levels in diabetic rats

It was observed that there was an increase in LDL (186.10mg/dl) and VLDL (27.15 mg/dl) levels and decrease in HDL (30.37 mg/dl) levels in diabetic rats compared to normal control. However after, after 21 days there was significant fall in LDL (94.6,110,90.8 mg/dl) and VLDL levels (13.2,14.1,12.6 mg/dl), while it increased HDL levels (57.2,52.4,61,63.5 mg/dl) compared to diabetic control rats respectively shown in table 4.

Table 4: Effect of extracts and formulation on HDL, VLDL and LDL levels in diabetic rats.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Serum total cholesterol (mg/dl)</th>
<th>Serum total glyceride (mg/dl)</th>
<th>Serum HDL levels (mg/dl)</th>
<th>Serum LDL levels (mg/dl)</th>
<th>Serum VLDL levels (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>163.9±1.69</td>
<td>64.65±1.58</td>
<td>55.78±1.37</td>
<td>95.20±2.62</td>
<td>12.93±0.31</td>
</tr>
<tr>
<td>Diabetic control</td>
<td>241.2±2.35</td>
<td>135.8±2.63</td>
<td>30.37±2.66</td>
<td>186.1±4.47</td>
<td>27.15±0.52</td>
</tr>
<tr>
<td>Cucurbita pepo (200mg/kg)</td>
<td>165.2±2.88</td>
<td>66.22±1.73</td>
<td>57.28±3.37</td>
<td>94.66±3.22</td>
<td>13.24±0.34</td>
</tr>
<tr>
<td>Corallocarpus epigaeus (50mg/kg)</td>
<td>176.6±2.26</td>
<td>70.90±2.71</td>
<td>52.42±2.90</td>
<td>110±4.92</td>
<td>14.18±0.54</td>
</tr>
<tr>
<td>Formulation (100 mg/kg)</td>
<td>162.6±2.21</td>
<td>63.15±2.73</td>
<td>61.02±2.58</td>
<td>90.88±1.70</td>
<td>12.63±0.54</td>
</tr>
<tr>
<td>Glibenclamide (5mg/kg)</td>
<td>161.2±1.59</td>
<td>61.40±1.58</td>
<td>63.50±1.49</td>
<td>85.37±0.93</td>
<td>12.28±0.31</td>
</tr>
</tbody>
</table>

4.5 Effect of extracts and formulations on SGPT and SGOT levels in diabetic rats

It was observed that there was an increased in SGPT (51.17IU/dl) and SGOT (48.67IU/dl) levels in diabetic controls compared to normal control rats. However, after 21 days administration had led to a significant fall in SGPT (29.3, 32.5,27.1 IU/dl) and SGOT.
(27.5, 30.3, 25.3 IU/dl) levels, when compared with the diabetic control group shown in table 5.

4.6 Effect of extracts and formulations on serum creatinine and serum urea levels in diabetic rats

It was observed that there was an increase in serum urea (71.67 mg/dl) and serum creatinine (1.36 mg/dl) levels in diabetic control compared to normal control rats. However after 21 days administration by orally, has led to significant fall in serum urea (36.6, 41.8, 32.5 mg/dl) and serum creatinine levels (0.57, 0.70, 0.55 mg/dl), when compared with the diabetic control group shown in table 5.

Table 5: Effect of extracts and formulations on serum creatinine and serum urea levels in diabetic rats

<table>
<thead>
<tr>
<th>Treatment</th>
<th>SGPT (IU/dl)</th>
<th>SGOT Levels (IU/dl)</th>
<th>Serum Urea Levels (mg/dl)</th>
<th>Serum Creatinine Levels (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>23.50±2.44</td>
<td>21.50±1.99</td>
<td>30.63±2.80</td>
<td>0.53±0.307</td>
</tr>
<tr>
<td>Diabetic control</td>
<td>51.17±3.15</td>
<td>48.67±2.80</td>
<td>71.67±3.87</td>
<td>1.36±0.0301</td>
</tr>
<tr>
<td>Cucurbita pepo (200mg/dl)</td>
<td>29.33±3.21</td>
<td>27.50±2.96</td>
<td>36.67±3.83</td>
<td>0.57±0.0378</td>
</tr>
<tr>
<td>Corallocarpus epigaeus (50 mg/dl)</td>
<td>32.50±3.39</td>
<td>30.33±2.90</td>
<td>41.83±3.53</td>
<td>0.70±0.0352</td>
</tr>
<tr>
<td>Formulation (100mg/dl)</td>
<td>27.17±3.49</td>
<td>25.33±2.91</td>
<td>32.50±2.93</td>
<td>0.55±0.0294</td>
</tr>
<tr>
<td>Glibenclamide (5mg/kg)</td>
<td>24±1.93</td>
<td>23.67±2.33</td>
<td>26.77±2.16</td>
<td>0.50±0.0145</td>
</tr>
</tbody>
</table>

5. DISCUSSION

Diabetes mellitus is a chronic metabolic disorder affecting a major population worldwide. It is caused by partial or complete insulin deficiency, which produces inadequate glucose control and leads to acute and chronic complications.[17]

Streptozotocin is a glucosamine-nitrosourea compound, and is an accepted model for induction of diabetes. Deficiency of insulin after streptozotocin treatment leads to an elevation in blood glucose levels.[12] Glibenclamide is a standard antidiabetic drug used. It has been involved in stimulating insulin secretion from pancreatic β-cells principally by inhibiting ATP sensitive K\textsubscript{ATP} channels in the plasma membrane.[12]

The preliminary qualitative phytochemical analysis of aqueous fruit extract of cucurbita pepo showed the presence of alkaloids, carbohydrates, proteins, flavonoids, triterpenoids, tannins,
and saponins. The ethanolic extract of tuberous root of corallocarpus epigaeus showed the presence of alkanoids, carbohydrates, flavonoids, aminoacids, steroids and triterpenoids.

In glucose tolerance test, the glucose levels were estimated before drug treatment and at different intervals thereafter. In the control group the blood glucose was found to increase linearly from basal value of 79.66mg/dl to 165.3 mg/dl in the first 30 minutes. After 60 minutes of glucose loading, the blood glucose was increased further. The maximum value of 253.3 mg/dl was seen at the 90 minute. Whereas, in the extracts and formulation treated animals, only a little elevation was seen in the blood glucose at 150 minute and maximum glucose tolerance was observed at 90 minute in aqueous extract of cucurbita pepo showed 83.5mg/dl, ethanolic extract of tuberous root of corallocarpus epigaeus treated rats showed 82.8mg/dl and their formulation treated rats showed 81mg/dl.

The diabetic rats treated with aqueous fruit extract of cucurbita pepo and ethanolic extract tuberous root of corallocarpus epigaeus and their formulation were evaluated to determine the effect on 1st, 7th, 14th, 21st days. Blood glucose levels results for cucurbita pepo showed 81mg/dl, corallocarpus epigaeus showed 104.34mg/dl while formulation showed 72.5 mg/dl treated rats. The blood glucose level study for above mentioned treated rats were significantly lower as compared as compared to diabetic rats (414.6mg/dl) on 21st day. Administration of extracts in separate manner decreased the blood glucose level to near normal control but treatment with composite extract formulation showed better decrease in blood glucose level. In case of serum lipid profile, it was observed that there was an increase in serum total cholesterol, serum total glyceride, LDL, VLDL whereas a decrease in HDL levels in diabetic rats. After 21 days continuous administration of aqueous extract of fruit of cucurbita pepo (200mg/kg b.w p.o), ethanolic extract of tuberous root of corallocarpus epigaeus (50mg/kg b.w p.o), their formulation (100mg/kg b.w p.o) in diabetic rats led to significant decrease in serum total cholesterol, serum total glyceride, LDL, VLDL levels in diabetic rats, while HDL levels were increased. Recovery was better in the composite extract than the individual extract treated group.

It was observed that there was an increase in SGPT, SGOT, Serum urea and serum creatinine levels in streptozotocin induced diabetic rats when compared with the normal control. However after 21 days continuous administration of aqueous extract of fruit of cucurbita pepo (200mg/kg b.w p.o), ethanolic extract of tuberous root of corallocarpus epigaeus (50mg/kg b.w p.o), their formulation (100mg/kg b.w p.o) in diabetic rats led to significant
fall in SGPT, SGOT, serum urea and serum creatinine when compared with the diabetic control group.

Diabetes is associated with hyperlipidaemia (Maiti et al., 2005). It is well documented that there is elevation of serum lipid concentration in diabetics (Chase and Glasgow, 1976). The extract treated groups showed hypocholesteremic effect, when compared to untreated diabetic groups. The composite extract treated diabetic rats showed significant recovery in serum lipid profile when compared to single administration of extract. This may be due to presence of hypocholesterolemic compounds that may act as inhibitors for some enzymes, which participates in cholesterol or reduces the absorption of cholesterol from intestine.¹⁸

6. CONCLUSION

The present study indicates that the aqueous fruit extract of cucurbita pepo, ethanolic extract tuberous root of corallocarpus epigaeus and their formulation possess the anti diabetic activity. Formulation was found to be more effective than aqueous fruit of Cucurbita pepo and ethanolic extract of tuberous root of corallocarpus epigaeus administered alone.

REFERENCES