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PHYTOCHEMICAL SCREENING, ANTIDIABETIC ACTIVITY STUDIES OF DIFFERENT EXTRACTS OF CLERODENDRON *SERRATUM AND TELESTRIA PURPUREA* IN NORMAL AND DIABETIC RATS

Chandaka Madhu, Dr. Shashi Alok, Dr. V. Raja Kumar
Bundelkand University, Kanpur Road, Bundelkhand University, Jhansi,
Uttar Pradesh 284128

Abstract:

The history of drugs is intimately linked with plants from the earliest times and even today plant products have extensive use in ethno medicine and traditional system of medicine. There has been a global resurgence of interestin plant based drugs due to several positive reasons.

The present research work has undertaken with an objective to establish scientifically the folkloric knowledge of the East-coast districts of Andhra pradesh on anti-diabetic activity of the weeds of medicinal value of clerodendron serratum (leaves) and telestria purpurea(root). A systematic study was carried out on the selected plant extracts(alcoholic & aqueous) to find qualitative chemical characterization, acute-toxicity study, evaluation of hypo-glycemic and anti-hyperglycemic activity in rats, for its anti-hyperglycemic activity

Results:

The leavesextract of Clerodendron serratumand Telestria purpureashowed the presence of flavonoids, phenolic compounds, glycosides, sterols, phenolic steroids and carbohydrates. The plant extracts showed no toxicity at a dose of 2000mg/kg as per OECD guidelines. Aqueous andalcoholic extracts of Clerodendron serratumand Telestria purpurea showed dose dependent hypoglycemic and anti-hyperglycemic activity. Between the two plants, extract of Clerodendron serratum leaves extract showed good activity in normal and diabetic rats. The maximum percent blood glucose reduction of alcoholic and aqueous extracts of Clerodendron serratum and Telestria purpurea was found to be at 6^{th} hour& 24^{th} hour respectively.

Conclusion:

The selected leaves extracts of Clerodendron serratum and Telestria purpurea showed hypoglycemic and anti-hyperglycemic activity in rats.

Key Words: *Clerodendron serratum , Telestria purpurea, hypoglycemic and anti-hyperglycemic activity*

Corresponding author:
Chandaka Madhu,
Bundelkand University,
Kanpur Road, Bundelkhand University,
Jhansi, Uttar Pradesh 284128
pharmamadhuphd@gmail.com
7799263656

QR code

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INTRODUCTION:

The history of drugs is intimately linked with plants from the earliest times and even today plant products have extensive use in ethnomedicine and traditional systems of medicine. Interest in medicinal plants as therapeutic alternates has increased enormously over the last three decades. The unexplored wealth of plant kingdom has become targetfor the search by multinational drug companies and research institutes forevaluation of new drug and lead molecules. Investigation of traditional remedies, largely of botanical origin has been used as source of medicine, on which a worldwide majority of the population still relies.

The present research work has been undertaken with an object to establish scientifically the folkloric knowledge of the east coastal districts of Andhra Pradesh on antidiabetic activity of the weeds of medicinal value of *Clerodendron serratum* and *Telestria purpurea*. The two plants belong to the same genus. The following two herbal drugs recorded in book of ayurveda as general tonic for improvement of health.

The plants are also found to be used by the tribals and folk in the east coastal districts of Andhra Pradesh India for various disorders of liver, spleen and inflammation and also in fever. However, there was no scientific systematic investigation carried out on these drugs for antidiabetic activity. Hence these two plants are selected for systematic investigation.

A systematic study was carried out on the following aspects of the plants.

(1) Preparation and qualitative chemical characterization of the alcoholand aqueous extracts of the selected plants.

(2) Acute toxicity study.

(3) Evaluation of hypoglycemic and anti-hyperglycemic activity of selectedplants.

METHOD AND METHODLOGY:

Experimental:

Materials:

Tolbutumide	(Sigma chemicals), St Louis, USA
Na H2 Po4	(SD fine chemicals)
EDTA	(SD fine chemicals)
STZ	Sigma chemicals
Glucose Kit	(Euro Diagnostic systems Pvt. Ltd.)

EXTRACTION PROCESS:

The alcoholic and aqueous extracts of selected herbal drugs are prepared by the process of continuous extraction (soxhlation) and maceration.

PRELIMINARY QUALITATIVE PHYTOCHEMICAL TESTS

The alcoholic and aqueous extracts of *Clerodendron serratum*and *Telestria purpurea*were subjected for qualitative chemical tests to find out the functional groups presence such as sterols, glycosides, saponins, carbohydrates, alkaloids, flavonoids, tannis, proteins and phenolic steroids.

ACUTE TOXICITY STUDIES:

Acute toxicity study was conducted for aqueous and alcoholic extracts of *Clerodendron serratum* and *Telestria purpurea*as per OECD guidelines 420 (OECD, 2001).

Evaluation of Hypoglycemic and Antihyperglycemic Activity of SelectedHerbal Drugs

Induction of Diabetes (Krishna Kumar K *et al* 1999):

Rats of either sex weighing 200gm were selected and fasted for 18 hr prior to experiment and water supplied *ad-libitum*. The animals were kept in colony cages at ambient temperature of 28 ± 2^0 C and relative humidity 45 to 55% with a 12 hr light/dark cycle. The rats were administered with 45 mg/kg of STZ intraperitoneally.

STZ Solution: STZ solution (45 mg/kg, i.p) was prepared freshly at the time of administration in citrated buffer. It was used within 10 minutes of its preparation.

Citrated buffer (PH 4.4, 0.1M): Citrated acid monohydrate 0.6306 was dissolved in 50 ml of distilled water. Trisodium citrate 0.7352 gm was dissolved in 25 ml of distilled water. 28 ml of citrated acid monohydrated and 22 ml of trisodium citrate solutions were taken and mixed together and the final volume was made up to 1000 ml with distilled water. The PH of the solution was adjusted to 4.4.

Extracts

Alcohol Extract of Gynandropsis Gynandra Aqueous Extract of Gynandropsis GynandraAlcohol Extract of Cleome Chelidonii Aqueous Extract of Cleome Chelidonii

Instruments used:

Semi Auto Analyzer (Lab India Health care)OPTIMAS Electronic digital balance

Protocol:

The Wister albino rats of either sex weighing 180-220 gm, selectedfor the study were kept in colony cages at ambient temperature of 28 ± 2^0 C and relative humidity of 45 to 55% with a 12 hrs light/dark cycle. The animals were fasted for 18 hrs before commencing the experiment and allowed water *ad libitum*. Each herbal extract was tested at three dose level. In this experiment the test preparations (1% Sod. CMC, Standard drug Tolbutamide and herbal extracts) were administered orally. The fasting was continued till completion of the experiment. The 'zero' hr samples were collected for the estimation of fasting serum glucose.

The experimental animals were divided into 28 groups and each consisting of six animals.

The following are the treatments tested:

Experimental Design:

Sl. No.	Group	Treatment
1	Group 1	Normal rats received 1% Sod.CMC orally
2	Group 2	STZ (45 mg/kg i.p) induced Diabetic rats received 1%Sod.CMC orally
3	Group 3	Normal rats received Tolbutamide (40 mg/kg) orally
4	Group 4	Diabetic rats received Tolbutamide (40 mg/kg) orally
5	Group 5	Normal rats received Alc. Ext. of leavesof *Clerodendron serratum* (100 mg/kg) orally
6	Group 6	Normal rats received Alc. Ext. of leavesof *Clerodendron serratum* 200 mg/kg) orally
7	Group 7	Normal rats received Alc. Ext. of leavesof *Clerodendron serratum* (400 mg/kg) orally
8	Group 8	Normal rats received Aq. Ext. of leavesof *Clerodendron serratum* (100 mg/kg) orally
9	Group 9	Normal rats received Aq. Ext. of leavesof *Clerodendron serratum* (200 mg/kg) orally
10	Group 10	Normal rats received Aq. Ext. of leavesof *Clerodendron serratum* (400 mg/kg) orally
11	Group 11	Diabetic rats received Alc. Ext. of leavesof *Clerodendron serratum*
		(100 mg/kg) orally
12	Group 12	Diabetic rats received Alc. Ext. of leavesof *Clerodendron serratum* (200 mg/kg) orally
13	Group 13	Diabetic rats received Alc. Ext. of leavesof *Clerodendron serratum* (400 mg/kg) orally
14	Group 14	Diabetic rats received Aq. Ext. of leavesof *Clerodendron serratum* (100 mg/kg) orally
15	Group 15	Diabetic rats received Aq. Ext. of leavesof *Clerodendron serratum* (200 mg/kg) orally

16	Group 16	Diabetic rats received Aq. Ext. of leavesof *Clerodendron serratum* (400 mg/kg) orally
17	Group 17	Normal rats received Alc. Ext. of leavesof *Telestria purpurea* (100 mg/kg) orally
18	Group 18	Normal rats received Alc. Ext. of leavesof *Telestria purpurea* (200 mg/kg) orally
19	Group 19	Normal rats received Alc. Ext. of leavesof *Telestria purpurea* (400 mg/kg) orally
20	Group 20	Normal rats received Aq. Ext. of leavesof *Telestria purpurea* (100 mg/kg) orally
21	Group 21	Normal rats received Aq. Ext. of leavesof *Telestria purpurea* (200 mg/kg) orally
22	Group 22	Normal rats received Aq. Ext. of leavesof *Telestria purpurea* (400 mg/kg) orally
23	Group 23	Diabetic rats received Alc. Ext. of leavesof *Telestria purpurea* (100 mg/kg) orally
24	Group 24	Diabetic rats received Alc. Ext. of leavesof *Telestria purpurea* (200 mg/kg) orally
25	Group 25	Diabetic rats received Alc. Ext. of leavesof *Telestria purpurea* (400 mg/kg) orally
26	Group 26	Diabetic rats received Aq. Ext. of leavesof *Telestria purpurea* (100 mg/kg) orally
27	Group 27	Diabetic rats received Aq. Ext. of leavesof *Telestria purpurea* (200 mg/kg) orally
28	Group 28	Diabetic rats received Aq. Ext. of leavesof *Telestria purpurea* (400 mg/kg) orally

RESULTS AND DISCUSSIONS:

1.percentage yield of the extracts:

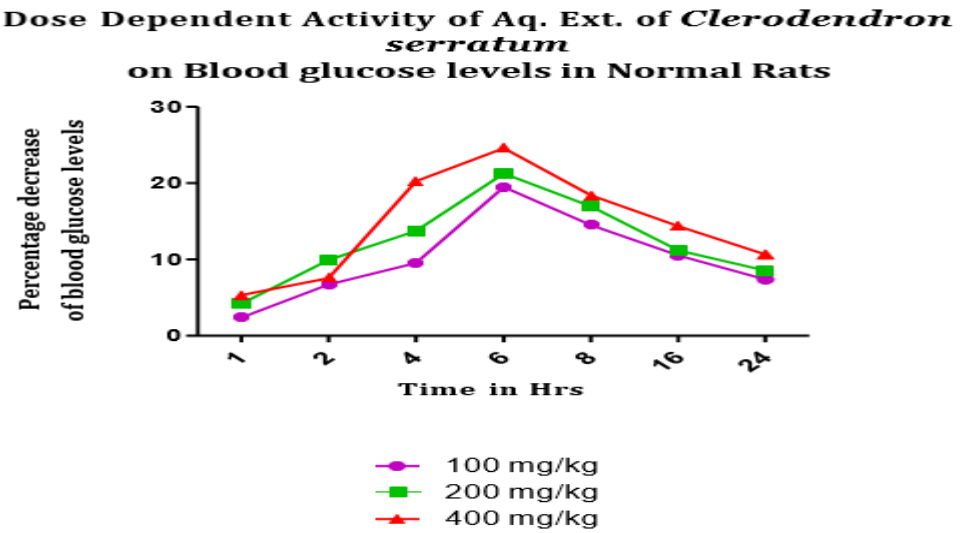
S.No	Name of the extract	% Yield in g(% w/w)
1	Alcoholic extract of *Clerodendron serratum*	1.53%
2	Aqueous extract of *Clerodendron serratum*	1.50%
3	Alcoholic extract of *Telestria purpurea*	3.20%
4	Aqueous extract of *Telestria purpurea*	4.00%

2. Details of qualitative phytochemical tests

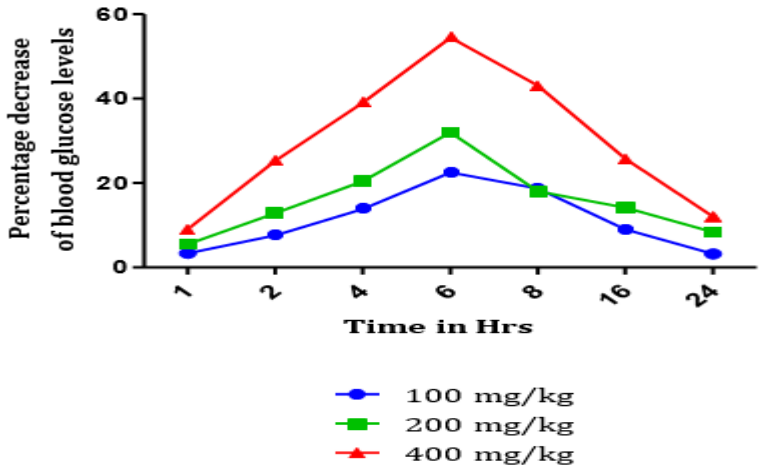
Test	*Clerodendron serratum*		*Telestria purpurea*	
	Alc.Ext.	**Aq.Ext.**	**Alc.Ext.**	**Aq.Ext.**
1.Sterols test				
Salkowski ‘s test	-	-	-	-
Libermann Burchard’s test	-	-	-	-
2. Glycosides test				
Baljet’s test	++	+	++	++

Keller-killiani test	++	+	++	++
Legal's test	++	+	++	++
3. Saponins test				
Foam test	-	-	-	+
4.Carbohydrates Test				
Molich's test	+	-	++	-
Barfoed's test	_	_	-	_
Benedict's test	_	_	_	_
Fehling test	-	-	-	-
5.Alkaloids tests				
Mayer's test	-	-	-	-
Wagner's test	-	-	-	-
Hager's test	-	-	-	-
Dragendorff's test	-	-	-	-
6. Flavonoids Test			-	-
Shinoda test	++	++	+	+
Zn-HCL reduction Test	++	++	+	+
7. Tests for Tannins				
Lead acetate test	+	-	+	-
Gelatin test	+	-	+	-
8. Test for Proteins				
Million's test	-	-	-	-
Ninhydrin test	-	-	-	-
9. Phenolic steroids Test				
Fecl3 test	++	++	++	-

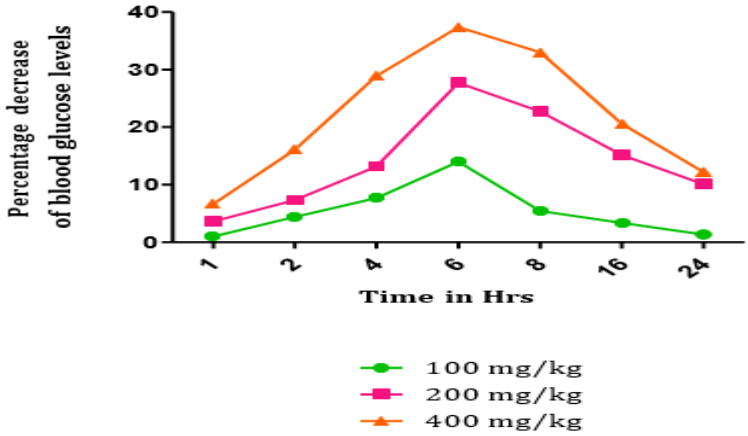
Antidiabetic activity:



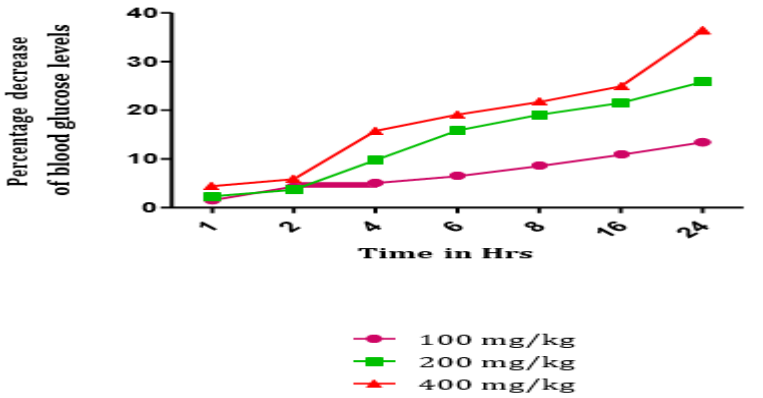
Dose Dependent Activity of Alc. Ext. of *Clerodendron serratum* on Blood glucose levels in Diabetic Rats



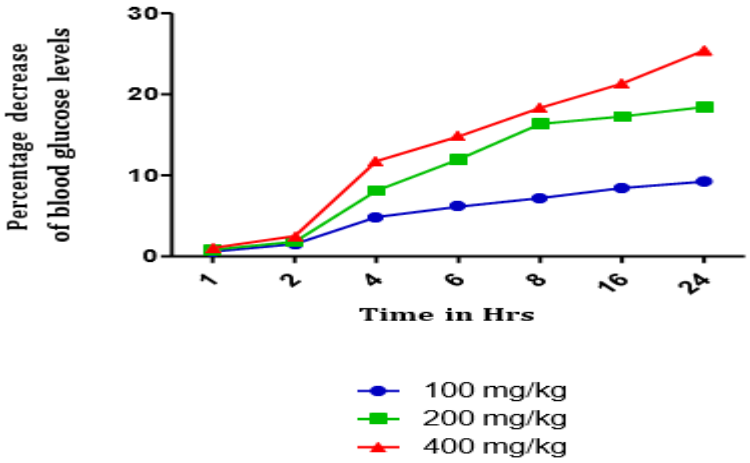
Dose Dependent Activity of Aq. Ext. of *Clerodendron serratum* on Blood glucose levels in Diabetic Rats



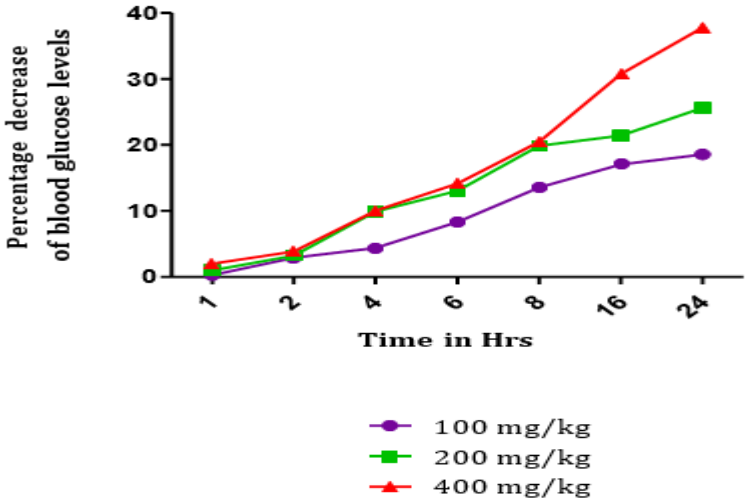
Dose Dependent Activity of Alc. Ext. of *Telestria purpurea* on Blood glucose levels in Normal Rats



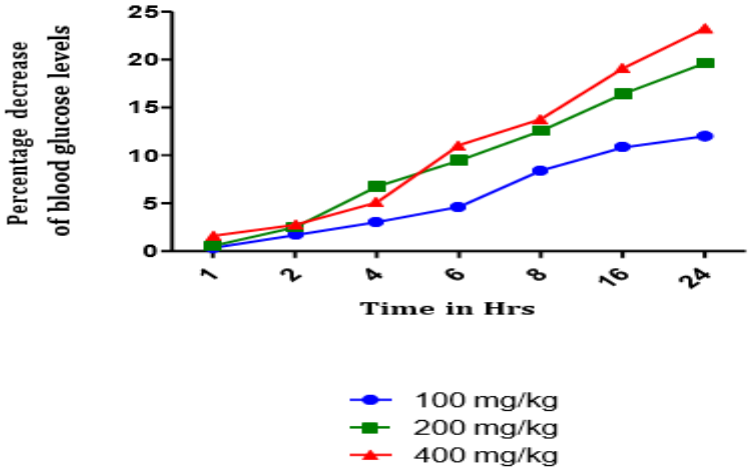
Dose Dependent Activity of Aq. Ext. of *Telestria purpurea* on Blood glucose levels in Normal Rats



Dose Dependent Activity of Alc. Ext. of *Telestria purpurea* on Blood glucose levels in Diabetic Rats



Dose Dependent Activity of Aq. Ext. of *Telestria purpurea* on Blood glucose levels in Diabetic Rats



The alcoholic extract of *Clerodendron serratum* showed significant dose dependent anti-hyperglycaemic activity in diabetic animals. The maximum percentage blood glucose reduction was observed at 6th hr at three dose levels and among the doses, 400 mg/kg dose produced good anti-hyperglycaemic activity (54.47%). The anti-hyperglycaemic activity is more in diabetic animals when compared to normal groups (Groups 8, 9, 10).

The animals in group 14 (Diabetic) received aqueous extract of leaves of *Clerodendron serratum*at a dose of 100 mg/kg. In this group, the maximum reduction in blood glucose was observed at 6th hr (252.77±2.67 mg/dl) and percentage blood glucose reduction was found to be 14.03%.

The animals in group 15 and 16 (Diabetic rats) received aqueous extract of leavesof *Clerodendron serratum*at a dose of 200 and 400 mg/kg respectively. The group 15 animals showed maximum blood glucose reduction at 6th hr (206.80±2.61 mg/dl) and percentage blood glucose reduction was found tobe 27.73%.

The animals in Group 16 showed the maximum blood glucose reduction at 6th hr (170.52±1.82 mg/dl) and percentage blood glucose reduction was found to be 37.43%. The aqueous extract of *Clerodendron serratum* showed dose dependent blood glucose reduction in diabetic animals and among doses 400 mg/kg showed maximum blood glucosereduction 37.43%). When compared with anti-diabetic activity of alcoholic extract, the aqueous extract showed less anti-hyperglycaemic activity.

Both alcoholic and aqueous extracts showed dose dependent anti- diabetic activity against STZ induced diabetic rats. Between these two extracts the alcoholic extract showed good anti-hyperglycaemic activity ata dose of 400mg/kg. The percentage blood glucose reduction in diabetic animals was more when compared with normal group of animal. The order of anti-hyperglycaemic activity of alcoholic and aqueous extracts as follows:

Alc. Ext. of leaves of *Clerodendron serratum*(400 mg/kg) > Aq. Ext. of *Clerodendron serratum*(400 mg/kg) > Alc. Ext. of *Clerodendron serratum*(200 mg/kg) > Aq. Ext. of *Clerodendron serratum*(200 mg/kg) > Alc. Ext. of *Clerodendron serratum*(100 mg/kg) > Aq. Ext.of *Clerodendron serratum*(100 mg/kg).

The alcoholic and aqueous extracts of leaves of *Telestria purpurea* were tested at three dose levels (100, 200 and 400 mg/kg each). In each case the initial tests were performed at a dose of 100 mg/kg. The alcoholic extract of *Telestria purpurea*showed dose dependent anti-hyperglycaemic activity in diabetic animals The maximum percentage blood glucose reduction was observed at 24th hr at three dose levels with selected three doses (100, 200 and 400 mg/kg) and 400 mg/kg dose produced good anti-hyperglycaemic activity (37.79%).

The blood glucose level in diabetic animals of group 26 at zero hr was found 279.04±2.08 mg/dl. The animals received aqueous extract of leaves of *Telestria purpurea*at a dose of 100 mg/kg. In this group, the maximum reduction in blood glucose was produced at 24th hr (245.44±1.19 mg/dl) and percentage blood glucose reduction was found to be 12.04%.

The blood glucose levels in diabetic animals of group 27 and 28 at zero hr were found to be 277.63±3.77 and 272.43±3.68 mg/dl respectively. The animals in group 27 and 28 were treated with aqueous extract of leavesof *Telestria purpurea*at a dose of 200 and 400 mg/kg respectively. The group 27animals showed maximum reduction in blood glucose at 24th hr (223.10±1.26 mg/dl) and the percentage blood glucose reduction was found to be 19.64%.

The animals in Group 28 showed the maximum reduction in blood glucose at 24th hr (209.02±1.44 mg/dl) and the percentage blood glucose reduction were found to be 23.27%. The results clearly indicated dose anti-hyperglycaemic activity of aqueous extract of *Telestria purpurea*

Both aqueous and alcoholic extracts showed dose dependent anti- diabetic activity against STZ induced diabetic rats . Between the two extracts the alcoholic extract produced good anti-hyperglycaemic activity at a dose of 400 mg/kg. The percentage blood glucose reduction in diabetic animals was more when compared with normal group of animal. Both alcoholic and aqueous extracts showed dose dependent, delayed onset of action and prolonged anti-diabetic activity at later hour (24th hr).

The order of antihyperglycaemic activity of extracts in diabetic groups as follows:

Alc. Ext. of leaves of *Telestria purpurea*(400 mg/kg) > Alc. Ext. of *Telestria purpurea*(200 mg/kg) > Aq. Ext. of *Telestria purpurea*(400 mg/kg) > Aq. Ext. of *Telestria purpurea*(200 mg/kg) > Alc. Ext. of *Telestria purpurea*(100 mg/kg) > Aq. Ext. of *Telestria purpurea*(100 mg/kg).

CONCUSSION:

There has been global resurgence of interest in the herbal drugs in the recent past. Though herbal medicines are effective in the treatment of various ailments very often drugs are unscientifically exploited or improperly used. Therefore herbal drugs deserve detailed studies in the light of modern medicine. A majority of population in India suffer from diabetes disease

due to various reasons. The development of effective anti-diabetic drugs is one of the major thrust areas of research currently. The present research work has been undertaken with an objective toinvestigate selected roots of herbal plants for anti-diabetic activity and to develop herbal formulation for the treatment of diabetes.

REFERENCES:

1. **Aaron I V.** Benefits of early initiation of Insulin therapy to long- term goals in Type 2 Diabetes mellitus. Insulin 2006; 1(1):1-12.
2. **Abdl- zaherAo**, Salim SY, Assaf MH, Abdel- Hady RH, *Teucriumpolium*antidiabetic activity and toxicity of *Zizyphusspina –Christi* leaves, J Ethnopharmocol 2005; 101(1-3): 129-138.
3. **Adebolu**, Olujoba O. Antiproliferative effects of *Gynandropsisgynandra*and *Piper methysticum* on human and lung cancer cells/ VILLANOVA UNIVERSITY, 2010.
4. **Aguilar-Bryan L**, Bryan J. Molecular biology of ATP-sensitive potassium channels. Endocr Rev 1999; 2:101–135
5. **Ahmed SM** "Study of effect of Nicorandil on Insulin prodution in Alloxan induced Diabetic rats" J Evidence based Medicine and health care 2(29): 2015; 4226-4236.
6. **Ajaiyeoba EO,** Onocha PA. Olarenwaju OT. *In vitro* Anthelmintic properties of *Buchholziacoriacea*and *Gynandropsisgynandra* extracts. PharmacBiol 2001; 39 (3):217-220.
7. **Ajaiyeoba EO.** Phytochemical and antimicrobial studies of *Gynandropsisgynandra*and *buchholziacoriaceae*extracts.Afr J Biomed Res2000; 3:161-165.
8. **Amany A A,**AmalA B, Hala E H. Effects of rosiglitazone and aspirin on experimental model of induced type 2 diabetes in rats: focus on insulin resistance and inflammatory markers Complic 2009. Articlein press accessed on 3/1/2010.
9. American diabetes association.Diagnosis and classification of Diabetes mellitus.Diabet Care 2008; 31(1):S55-S60.
10. **Arjyun P**, Shivesh J, Sahu A, Antidiabetic activity of aqueous extract of *Eucalyptus citriodora*hook in alloxan induced diabetic rats Pharmacogn Mag 2009; 5:51-54.
11. **Arumugam S**, Perumal S. Protective effect of bark and empty pod extracts from *Acacia auriculiformis* against paracetamol intoxicated liver injury and alloxan induced type II diabetes, Food Toxicol 2013; 56: 162-170.
12. **Ashcroft FM**, Gribble FM. ATP sensitive K+ channels & insulin secretion, their role in health and diseases. Diabetologia, 1999; 42: 903-19
13. **Ashok Kumar BS**, Antidiabetic, antihyperlipidemic and antioxidant activities of methanolic extract of *Amaranthusviridis* Linn in alloxan induced diabetic rats, ExperToxicolPathol, 2012;64: 75-779
14. **Asis B,** Biswakanth K, Pallab KH, Upal KM, SamitB.Evaluation of anticancer activity of *Cleome gynandra*on Ehrlich's ascites carcinoma treated mice. J Ethnopharmacol 2010; 129 (1):131-134.
15. **Aumir M.**Microalbuminuria as a predictor of diabetic retinopathy in non Insulin dependent Diabetes mellitus (Unpublished PG Thesis, MD, General Medicine) Rajiv Gandhi University of Health Scientific, Karnataka, 2002.
16. **Bedoya FJ,**Solano F, Lucas M. N-monomethyl-arginine and nicotinamide prevent streptozotocin-induced double strand DNAs breakformation in pancreatic rat islets. Experientia 1996; 52:344-347.
17. **Bnouham M**, Ziyyat A, Mekhfi H, Tahri A, Legsyer A, Medicinal plants with potential antidiabetic activity- a review of ten years of herbal medicine research, (1990-2000), Int J DiabetMetab, 14: 2006; 1-25.
18. **Borgio,** Pravin KT, ArchanaL . Toxicity of *Gynandropsispentaphylla*DC extracts against microbials and Its phytochemical profile. Ethnobot Leaf 2008; 12: 320- 336.
19. **Brandy P,** Ali A J, Vivian A F. Mechanisms and therapeutic targets in type 2 diabetes mellitus. Drug Discov Today: Disease mechanisms 2004; 1(2):151-157.
20. **Carter SK,**Broder L, Friedman M. Streptozotocin and metastatic insulinoma. Ann Intern Med 1971; 74:445-446.
21. **Chattopadhyay S.** Animal models in experimental diabetes mellitus.
    i. Indian J ExperBiol 1997; 1141-1145.
22. **Chauhan A**, Sharma PK, Srinivastava P, Kumar N, Duehe R, Plants having potential anti-diabetic activity, A review, Der Pharm Let2010; 2(3):369-387
23. **Cotella N, Bernier JL**, Catteanu JP, Pommery J, Wallet JC et al. Anti- oxidant properties of hydroxyl-flavones. Free RadicBiol Med 1996;20: 35-43.
24. **Craig ME,**Hattersley A, Donaghue KC. Definition, epidemiology andclassification of diabetes in children and adolescents. PediatDiabet2009: 10(12): 3-12.
25. **D Sivanesa,** Hazeena BV. Preventive role of *G. gynandra*L against aflatoxin B1 induced

lipid peroxidation and antioxidant defense mechanism in rat .Ind J ExperBiol 2007; 45: 299-303.

26. **Dallak M**, Al- khateeb M, Abbas M, Elessa R, Al- hashem F et al, *In vivo* acute, normo –hypoglycemic, antihyperglycemic, insulinotropic actions of orally administered ethanol extract of *Citrulluscolocynthis*(L) Scharb pulp, Am J BIochemBIotechnol 2009; 5(3): 119-126.
27. **Dina E G.**New therapies for diabetes.Insulin therapy in type 2 diabetes.Clinic Cornerstone. 2007; 8(20):58-65.