International Journal of Pharmaceutical Research and Development (IJPRD)
Platform for Pharmaceutical Researches & Ideas
www.ijprd.com

EVALUATION OF ANTIOXIDANT AND ANTIHYPERLIPIDEMIC ACTIVITY OF *BLUMEA ERIANTHA* DC EXTRACTS

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ABSTRACT

Ethanolic and aqueous extracts of the stem and root of Blumea eriantha DC were prepared and assessed for in vitro antioxidant activity by various methods namely total reducing power, scavenging of various free radicals such as 1,2-diphenyl-2-picrylhydrazyl (DPPH), super oxide, nitric oxide, and hydrogen peroxide. The percentage scavenging of various free radicals were compared with standard antioxidants such as ascorbic acid and butylated- hydroxyl anisole (BHA). The extracts were also evaluated for antihyperlipidemic activity in Triton WR-1339 (iso-octyl polyoxyethylene phenol)-induced hyperlipidemic albino rats by estimating serum triglyceride, very low density lipids (VLDL), cholesterol, low-density lipids (LDL), and high-density lipid (HDL) levels.Significant antioxidant activity was observed in all the methods, ($P < 0.01$) for reducing power and ($P < 0.001$) for scavenging DPPH, super oxide, nitric oxide, and hydrogen peroxide radicals. The extracts showed significant reduction ($P < 0.01$) in cholesterol at 6 and 24 h and ($P < 0.05$) at 48 h. There was significant reduction ($P < 0.01$) in triglyceride level at 6, 24, and 48 h. The VLDL level was also significantly ($P < 0.05$) reduced from 24 h and maximum reduction ($P < 0.01$) was seen at 48 h. There was significant increase ($P < 0.01$) in HDL at 6, 24, and 48 h. From the results, it is evident that alcoholic and aqueous extracts of Blumea eriantha DC can effectively decrease plasma cholesterol, triglyceride, LDL, and VLDL and increase plasma HDL levels. In addition, the alcoholic and aqueous extracts have shown significant antioxidant activity. By the virtue of its antioxidant activity, Blumea eriantha DC may show antihyperlipidemic activity.

Keywords *Antihyperlipidemic, antioxidant, Blumea eriantha DC, triton*

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INTRODUCTION

Oxidation is one of the destructive processes, wherein it breaks down and damages various molecules. Oxygen via its transformation produces reactive oxygen species (ROS) such as super oxide, hydroxyl radicals, and hydrogen peroxide. They provoke uncontrolled reactions. [1] Molecular oxygen is an essential component for all living organisms, but all aerobic species suffer from injury if exposed to concentration more than 21%. [2] Free radicals attack and induce oxidative damage to various biomolecules including proteins, lipids, lipoproteins, and DNA. [2],[3] The body possesses several defense systems comprising enzymes and radical scavengers. [1] Some of them constitute the repair systems for biomolecules that are damaged by the attack of free radicals. [3]Antioxidants are compounds that act as inhibitors of the oxidation process and are found to inhibit oxidant chain reactions at small concentrations and thereby eliminate the threat of pathological processes. [1] Phenolic compounds present in medicinal plants have been reported to posses powerful antioxidant activity. [2] Flavanoids are a major class of Phenolic compounds present in medicinal plants and are found to have a potential role in prevention of various diseases through their antioxidant activity. [4] *Blumea eriantha* DC is commonly known as 'Nimurdi' (Marathi), Kukronda in Hindi, a slender herb, dichotomously branched, covered with white and silky hair, distributed in Karnataka, Maharashtra, U.P., M.P., Bihar and Orissa. It is perennial herb upto 1m in height, leaves are 2.0-19.0 cm × 0.6- 6.0 cm, lower obovate, short petiolated, upper elliptic- ovate to oblanceolate, cordate clasping; capitula axillary or terminal, with numerous yellow florets, rarely bisexual marginal female, achenes brown, shining, sparsely pilos with white pappus.[1]Juice of herb used as 'carminative'. Leaves along Vitex negundo Linn and Careya arborea Roxb as Fomentation, sudorific, diuretic and emmenogogue. [2]Plant is used in Rheumatic pain[3] leaves in cough and common cold. "Erianthin" isolated from flower characterized as 5-hydroxy-3,3',4',6,7, pentamethoxyflavone, essential oil possessing a camphor like smell and consisting d-carvotanacetone and erianthin isolated from seeds also. The essential oil extracted from leaves and stem showing potent antibacterial activity, antifungal, insecticidal

LD50 of 50% ethanolic extract of plant was found to be >100mg/kg in mice[1]. Since polyphenolic compounds are present in the ethanolic and aqueous extracts of stem and root of *Blumea eriantha* DC, it was thought that it would be worthwhile to evaluate the plant for antioxidant activity. Lipids are one of the most susceptible targets of free radicals. [3] This oxidative destruction is known as lipid peroxidation and may induce many pathological events. Apart from antioxidant studies, the present study therefore also involves evaluation of antihyperlipidemic activity.

MATERIAL AND METHODS:

Plant material and extraction: The stem and root of *Blumea eriantha* DC. were procured and authenticated from department of pharmacognosy KNIMT-FOP SULTANPUR. The authenticated stem and root were dried in shade and powdered coarsely. Extraction was done according to standard procedures using analytical grade solvents. Coarse powders of the root (1 kg) and stem (1.1 kg) were separately Soxhlet extracted with 90% ethanol. The aqueous extract was prepared using the same marc by the process of maceration. The extracts obtained were concentrated under reduced pressure to yield the ethanolic extract of stem and root (7.3 and 7.2%, respectively) and the aqueous extract of stem and root (3.4% each).

Preparation of test solution: The various extracts such as *Blumea eriantha* DC stem alcoholic (BESA), stem water (BESW), root alcohol (BERA), and root water (BERW) extracts at various concentrations were prepared in water and used for in vitro antioxidant studies. Pilot studies were carried out for the ethanolic and aqueous extracts of stem and root of *Blumea eriantha* DC for in vitro antioxidant studies and the concentrations at which the extracts gave good antioxidant activity was selected.

Animals*:* Albino male Wister rats weighing between 150 and 200 g were procured from registered breeders. The animals were housed under standard conditions of temperature (25 ±2°C) and relative

humidity (30-70%) with a 12:12 light-dark cycle. The animals were fed with standard pellet diet and water ad libitum. Approval of the Institutional Animal Ethics Committee (IAEC) of Kamla Nehru Institute of Management and Technology Faculty of Pharmacy, Sultanpur .was obtained.

Acute toxicity studies: Acute toxicity studies for aqueous and ethanolic extracts of *Blumea eriantha* DC were conducted as per OECD guidelines 423 [18] using albino Wister rats. Each animal was administered the aqueous solution of the extract by oral route. The animals were observed for any changes continuously for the first 2 h and upto 24 h for mortality.

Antioxidant studies*:* The ability of the extracts to scavenge hydrogen peroxide, [19] DPPH (1,2-diphenyl-2-picrylhydrazyl) radical, [19] nitric oxide, [20],[21] Superoxide radical, [4] and its reducing power [19] was determined at different concentrations. Butylated Hydroxy anisole (BHA) and ascorbic acid were used as standards for the various in vitro antioxidant studies. The percentage scavenging of various radicals were calculated using the following formula: % Radical scavenged= Ao-A1/Ao

where A_0 is absorbance of the free radical alone and A_1 is absorbance of free radical in the presence of extract/standard. All the experiments were performed in triplicate.

Antihyperlipidemic activity: The method of Tamasi et al. [22] was used for evaluation of antihyperlipidemic activity. Albino Wister rats weighing between 190 and 250 g were assigned to various groups of six animals each. Animals were fasted for 16 h prior to the experiment with water *ad libitum*. The various extracts, *Blumea eriantha* DC stem-water extract (BESW), ethanolic extract (BESA), *Blumea eriantha* DC root-water extract (BERW), and ethanolic extract (BERA) each at doses of 200 and 400 mg/kg body weight, Simvastatin at 4 mg/kg and fenofibrate at 20 mg/kg, were administered p.o. to groups II to XI, respectively. Group I served as control. On the day of the experiment, the animals of the groups II-XI received the respective drugs by oral route. Simultaneously, all the animals received Triton WR-1339 at 100 mg/kg body weight by intraperitoneal route. The control animals were given only Triton WR-1339 at 100 mg/kg body weight. Serum cholesterol, triglyceride, and HDL were estimated at 6, 24, and 48 h using AGAPPE diagnostic kits. Blood samples were withdrawn by retroorbital puncture. Total cholesterol was estimated by CHOD-PAP methodology, Triglycerides by GPO-PAP methodology, and HDL by the precipitation method using phosphotungstate magnesium acetate reagent.

Chemicals:

The chemicals DPPH (1,2-diphenyl-2-picrylhydrazyl), N-(1-Naphthyl) ethylenediamine dihydrochloride, Triton WR-1339, NADH, SNP, phenazine methosulphate, trichloro acetic acid, and potassium ferricyanide were purchased from Sigma Chemicals, St Louis, MO, USA. All other chemicals and reagents used were of analytical grade. UV-1700 Shimadzu UV-Vis spectrophotometer was used for in vitro anti-oxidant studies.

Statistical analysis*:*

All the values are presented as mean α SD. Data were statistically analyzed by one-way ANOVA followed by post hoc test; P values < 0.05 were considered as statistically significant. Linear regression analysis was used for calculation of IC_{50}.

RESULTS: ACUTE TOXICITY STUDIES:

There was no mortality and noticeable behavioral changes in all the groups tested. The aqueous and ethanolic extracts of stem and root of *Blumea eriantha* DC were found to be safe upto 2000 mg/kg body weight.

TABLE- IC values± SD (µg/ml) for free radical scavenging activity.

IC values± SD (µg/ml) for free radical scavenging activity.

Test/standard group	Hydrogen peroxide	DPPH	Nitric oxide	Superoxide
Ascorbic acid	9.91 ± 1.03	30.35 ± 1.12	-	-
BHA	10.96 ± 2.11	29.11 ±1.03	368.00 ±2.60	435.40 ± 2.60
BERW	11.74 ± 2.98	37.73 ± 1.73	478.80 ± 3.40	502.10 ±8.00
BERE	10.78 ± 1.70	36.01 ± 1.25	415.12 ± 2.88	445.30 ±4.04

BESW	10.23 ± 1.11	48.25 ± 2.49	405.80 ± 5.43	481.30 ±5.00
BESE	9.85 ± 0.93	30.5 ±1.61	362.90 ± 3.80	414.60 ±6.12

BHA= Butylated Hydroxy Anisole, BERW=Blumea eriantha root aqueous extract. , BERE= Blumea eriantha root ethanolic extract. , BESW= Blumea eriantha stem aqueous extract, ESE= Blumea eriantha stem ethanolic extract

Hydrogen peroxide scavenging activity*:*

At 10 µg/ml concentration, BESW, BESA, and BERA produced H_2O_2 scavenging activity comparable ($P < 0.05$) to that of the standards BHA and ascorbic acid, BHA, BERW, BERA, BESW, and BESA were found to have IC_{50} (mean ± SD) of 9.917 ± 0.01, 10.95 ± 0.03, 11.74 ± 0.21, 10.78 ± 0.17, 10.23 ± 0.11, 9.85 ± 0.03, respectively [Table 1].

DPPH radical scavenging activity

The various extracts produced significant DPPH radical scavenging activity from 10 µg/ml. The IC_{50} (mean ± SD) of ascorbic acid, BHA, BERW, BERA, BESW, and BESA were found to be 30.55 ± 0.52, 29.11 ± 0.03, 37.73 ± 0.37, 36.10 ± 0.50, 45.85 ± 0.49, 30.50 ± 0.16, respectively [Table 1].

Nitric oxide radical scavenging activity:

Scavenging of nitric oxide by various extracts was found to be concentration dependent. Maximum inhibition of nitric oxide formation was produced by BESA at concentration of 500 µg/ ml and had IC_{50} of 362.90 ± 3.80 as against 368.00 ± 2.60 for BHA [Table 1] and [Table 2].

TABLE-2

Group(mcg/ml)	Reducing power(absorbance)	Nitric acid scavenged (%)	Superoxide radical scavenged (%)
ASCORBIC ACID			
100	0.09±0.01	-	-
200	0.19±0.03	-	-
300	0.61±0.03	-	-
400	0.77±0.01	-	-
500	1.47±0.05	-	-
BHA			
100	0.13±0.01*t2	13.95±0.41	20.51±0.60
200	0.24±0.01*t2	20.86±0.43	29.20±0.45
300	0.80±0.05*t2	34.20±0.18	38.36±0.39
400	1.08±0.02*t2	40.11±0.15	56.11±0.12
500	1.75±0.02*t2	60.86±0.41	65.78±0.51
BERW			
100	0.01±0,00	12.44±0.21	20.40±0.62*t1
200	0.04±0.01	18.78±0.13	29.50±0.16*t1
300	0.10±0.02	26.68±0.26	35.98±0.17
400	0.24±0.03	35.01±0.16	39.46±0.19
500	0.74±0.03	52.61±0.41	50.67V0.45
BERE			
100	0.04±0.01	12.44±0.61	33.44±0.62*t3
200	0.09±0.01	21.65±0.14*t3	36.48±0.50*t2
300	0.40±0.02	32.18±0.13	39.00±0.24*t2
400	0.80±0.01*t3	39.86±0.11*t3	45.84±0.20*t3
500	1.65±0.03*t3	59.12±0.12*t3	55.9. ±0.25
BESW			
100	0.01±0.00	14.86±0.44*t3	32.64±0.67*t2
200	0.04±0.01	23.84±0.54*t3	35.21±0.72
300	0.40±0.02	30.14±0.11	40.97±0.12*t1

400	0.80±0.01	35.64±0.61	46.95±0.65*t1
500	1.05±0.01	54.84±0.31	55.80±0.44
BESE			
100	0.05±0.00	10.86±0.44*t3	31.44±0.66*t3
200	0.09±0.00	20.68±0.54*t2	35.00±0.84*t3
300	0.47±0.02	31.68±0.31	50.12±0.14
400	0.82±0.01	40.58±0.11*t3	54.30±0.22*t3
500	1.60±0.08*t3	61.05±0.38*t3	57.90±0.09

Values are mean±SD. (n==3) *t1<0.05, *t2<0.01, *t3<0.001 as compared to BHA= Butylated Hydroxy Anisole, BERW=Blumea eriantha root aqueous extract. , BERE= Blumea eriantha root ethanolic extract. , BESW= Blumea eriantha stem aqueous extract, BESE= Blumea eriantha stem ethanolic extract respectively.

TABLE-3.

Group	Serum cholesterol (mg/dl) after 6 h	Serum LDL(mg/dl) after 6 h	Serum cholesterol (mg/dl) after 24 h	Serum LDL(mg/dl) after 24 h	Serum cholesterol (mg/dl) after 48 h	Serum LDL(mg/dl) after 48 h
Control	99.70±1.86**	88.27±0.73	81.54±0.99	59.06±4.17	60.44±2.71**	45.53±0.71**
BESW 200	88.32±1.35	58.88±0.79***	84.51±1.38	65.04±0.40***	59.39±3.26	29.75±0.76
BESW 400	76.26±0.97**	43.71±0.79	57.57±1.17**	23.56±0.76**	55.25±3.09**	23.65±0.72***
BERW200	93.54±0.90*	73.35±0.86**	81.62V1.17	57.54±0.74	68.34±3.24	49.23±0.69*
BERW 400	65.58±0.56**	33.55±0.85	60.33±0.93	25.42±1.42**	57.98±1.41**	29.32±0.70
BESE 200	66.53±0.60	38.74±0.95**	67.44±0.70***	36.74±0.80***	55.38±1.30***	31.33±0.72**
BESE 400	63.48±0.70**	39.13v0.89	59.52±0.67	26.60±0.84	53.44±2.34	28.22±0.67***
BERE 200	61.35±0.80	39.49±0.70***	59.69±0.58*	33.47±1.31**	54.34±2.34**	30.64±0.72***
BERE 400	59.61±0.74***	32.19±0.89**	60.27±1.43***	26.41±0.97*	51.52±1.41**	27.61±0.80*
simvastatin	52.38±0.93**	22.54±0.89	51.20±1.01**	22.75±0.96**	62.29±1.47***	47.21±0.80**
fenofibrate	61.16±0.67	29.73±0.90***	62.28±1.43	33.32±0.94**	62.38±1.37*	44.73±0.47**

Values are expressed as mean ± SD.(n==6) . Cholesterol and LDL concentration are estimated by the standard method and the values are expressed as *P1<0.05, **P2<0.01, ***P3<0.001 when compared with standard groups, a-Simvastatin, b-fenofibrate, BERW=Blumea eriantha root aqueous extract. , BERE= Blumea eriantha root ethanolic extract. , BESW= Blumea eriantha stem aqueous extract, BESE= Blumea eriantha stem ethanolic extract respectively at 200 and 400 mg/kg body weight.

Total reducing power: From 50 µg /ml, all the extracts and standard-ascorbic acid and BHA showed reductive capabilities. At 500 µg/ ml, the reducing power of standards and extracts showed the following order: BHA > BERA > BESA > Ascorbic acid > BESW > BERW. Reducing power of BESA and BERA at 500 µg /ml was comparable ($P < 0.05$) to that of ascorbic acid [Table 2].

Superoxide anion radical scavenging activity*:* Superoxide anion radical generation was inhibited by BHA (standard) and extracts from 100 µg /ml. The various extracts produced significant Superoxide radical scavenging activity in a concentration-dependent manner. BESA showed the lowest IC_{50} value (414 ± 6.22) followed by BHA (435.40 ± 7.78).

Antihyperlipidemic activity: Administration of Triton resulted in increase in serum levels of cholesterol, triglycerides, VLDL, and LDL. A significant reversal in serum levels of cholesterol, triglycerides, VLDL, and LDL levels was noticed in the animals treated with *Blumea eriantha* DC root and stem extracts when compared with the control group [Table 2] and [Table 3].

TABLE-4

Group	Serum triglyceride (mg/dl) after 6 h	Serum VLDL (mg/dl) after 6 h	Serum triglyceride (mg/dl) after 24 h	Serum VLDL (mg/dl) after 24 h	Serum triglyceride (mg/dl) after 48 h	Serum LDL (mg/dl) after 48 h
Control	67.70±0.71	13.72±0.95	61.17±0.84*	12.10±0.89	79.40±1.34	15.81±1.01
BESW 200	63.72±1.36	12.66±0.88**	60.22±0.83**	20.17±1.01	54.47±0.66**	10.84±0.80***
BESW 400	60.77±1.39**	12.10±0.94	57.65±0.70	11.50±0.88	54.56±0.74*	11.82±0.86***
BERW200	68.32±0.52	13.66±0.73**	54.17±0.66	10.71±1.00	59.68±1.73***	10.18±0.81***
BERW 400	63.43v0.79*	12.60±0.87	54.55±0.82**	10.81±0.82**	50.29±0.69	9.75±0.88***
BESE 200	62.50±0.87*	12.46±0.86*	51.61±0.60	10.43±0.76	49.45±0.66**	8.84±0.88***
BESE 400	60.18±1.01	11.90±0.78	52.31±0.67	10.42±0.76**	43.67v0.73	12.13±0.81**
BERE 200	67.48±1.52**	13.48±0.85	58.46±4.16	12.20±0.89***	48.26±0.71*	9.60±0.77**
BERE 400	60.55±0.70*	12.23±0.83*	50.89±1.06**	10.56±0.75**	48.45±0.68***	10.82±0.71**
Simvastatin	63.73±1.71*	12.66±0.86	63.24±0.91	12.50±0.86	65.34±0.75	13.19±0.95*
fenofibrate	55.20±0.98**	11.34±0.32**	54.1±0.71***	10.84±0.64	58.58±1.27**	11.91±0.75

Values are expressed as mean ± SD.(n==6) triglyceride and VLDL concentration are estimated by the standard method and the values are Expressed as *P1<0.05, **P2<0.01, ***P3<0.001 when compared with standard groups ,a-simvastatin,b-fenofibrate,BERW=Blumea eriantha root aqueous extract. , BERE= Blumea eriantha root ethanolic extract. , BESW= Blumea eriantha stem aqueous extract, BESE= Blumea eriantha stem ethanolic extract respectively at 200 and 400 mg/kg body weight.

Simvastatin (standard) produced maximum cholesterol- and LDL-lowering effect at both 6 h and 24 h. BERW 400, BERA 200 and 400 and BESA 200 and 400 produced a significant decrease in serum cholesterol and LDL levels, which was found to be significantly greater than the effects of fenofibrate (at 6 h, 24 h and 48 h) and Simvastatin (at 48 h) [Table 2]. Maximum reduction of triglyceride and VLDL levels was produced by fenofibrate at 6 h. At 24 h and 48 h, aqueous and ethanolic extracts of *Blumea eriantha* DC root and stem produced significant triglyceride- and VLDL-lowering effect which was comparable to that of fenofibrate and significantly greater than that of Simvastatin [Table 4].

Simvastatin, fenofibrate, and various extracts except BERW and BERA200 mg/kg produced significant ($P < 0.01$) increase in serum HDL level at 6, 24, and 48 h when compared to control. At 6 h and 24 h all the extracts except BERA 200 and BERW 400 produced a significant ($P < 0.01$) increase in HDL level, which was significantly greater than that of Simvastatin and fenofibrate. At 48 h BESW 200 and 400, BERA 200 and BERW 200 produced significant ($P < 0.01$) increase in HDL level, which was significantly greater than that of Simvastatin and fenofibrate [Table 5].

Table 5

Group	Serum HDL(mg/dl) after 6 hrs	Serum HDL(mg/dl) after 24 hrs	Serum HDL(mg/dl) after 48 hrs
Control	34.20±1.39	32.72±1.00	31.6 ±0.88
BESW 200	42.12±0.87***	40.73±0.94***	40.76 ±0.89***
BESW 400	44.53±1.58	45.54±0.94***	42.61 ±0.88***
BERW200	34.41±1.84***	34.48±0.78	31.28 ±1.01
BERW 400	44.79±0.73**	45.41±0.92***	39.01 ±0.34***
BESE 200	40.20±0.75	42.2±0.83	35.35 ±0.56**
BESE 400	40.40±1.20***	44.56±0.97**	34.42 ±0.14**
BERE 200	35.38±1.50	37.54±0.69	36.30 ±045*

BERE 400	39.41±0.57**	44.08±0.85***	38.35 ±045**
simvastatin	42.65±0.76*	40.89±0.87*	38.35 ±0.98*
fenofibrate	42.09±0.74	39.73±0.81**	39.45 ±044**

Values are expressed as mean ± SD.(n==6 HDL concentration are estimated by the standard method and the values are Expressed as *P1<0.05, **P2<0.01, ***P3<0.001 when compared with The control group ,a-simvastatin,b-fenofibrate,BERW=Blumea eriantha root aqueous extract. ,BERE= Blumea eriantha root ethanolic extract .,BESW= Blumea eriantha stem aqueous extract ,BESE= Blumea eriantha stem ethanolic extract respectively at 200 and 400 mg/kg body weight.

DISCUSSION

The potentially reactive derivatives of oxygen ascribed as ROS such as Superoxide radical, hydroxyl radical, and hydrogen peroxide are continuously generated inside the human body as a consequence of exposure to exogenous chemicals and/or a number of endogenous metabolic processes involving redox enzymes and bioenergetics electron transfer. [4] Owing to the ROS overproduction and/or inadequate antioxidant defense, there is upsurge of ROS and this culminates in oxidative stress. It is quite interesting to note that plants have good antioxidant ability and are safer than the synthetic antioxidants. [4] The antioxidant activity can be attributed to various mechanisms like prevention of chain initiation, binding of transition metal ion catalysts, decomposition of peroxides, reductive capacity, and radical scavenging activity. [4] In the present study, five different antioxidant methods for evaluation of antioxidant activity have been used .Ethanolic and aqueous extracts of *Blumea eriantha* DC root and stem produced significant antioxidant activity. This can be attributed to the Flavanoids and other phytoconstituents present in the extracts. Stem ethanolic extract produced significantly greater antioxidant activity than root ethanolic and aqueous extracts. Hyperlipidemia is one of the important risk factors involved in the development of cardiovascular diseases. Atherosclerosis and congestive heart diseases are strongly associated with disorders of lipid metabolism and plasma lipoproteins. Triton WR-1339-treated rats are considered to be a useful acute hyperlipidemic model associated with inactive lipoprotein lipase. [23] Triton WR-1339 acts as a surfactant to block the uptake of lipoprotein from the circulation by extra hepatic tissues resulting in an increase in the level of circulatory lipoproteins. [24] Triton WR-1339-induced hyperlipidemic rats treated with BESW, BESA, BERW, and BERA produced reversal of increase in serum cholesterol and triglycerides and LDL from the 6 h upto 48 h and VLDL from 24 h. Ethanolic and aqueous extracts of *Blumea eriantha* DC root and stem produced significant cholesterol and LDL lowering effect at 6, 24, and 48 h. This indicates that *Blumea eriantha* DC not only reduces the synthesis of cholesterol, but may also reduces its metabolism. The extracts were found to be enriched in Flavanoids and it is reported that Flavanoids are found to inhibit HMG-CoA reductase activity. [23] It may be concluded that the cholesterol-lowering effect of *Blumea eriantha* DC stem and root extracts may be due to inhibition of HMG-CoA reductase activity. Simvastatin being a specific HMG-CoA inhibitor produces its hypocholesterolemic activity by reducing cholesterol synthesis. Increase in triglyceride level was evident in control animals due to inhibition of lipoprotein lipase (LPL) by Triton. Treatment with ethanolic and aqueous extracts of *Blumea eriantha* DC resulted in reduction of triglyceride levels. It is likely that treatment with *Blumea eriantha* DC root have lowered the serum triglyceride level by activating LPL. LPL is a prime enzyme related to triglyceride metabolism. Further VLDL levels were reduced significantly at 24 and 48 h. The various extracts also showed protective action by increasing serum HDL level. The increased HDL facilitates the transport of triglyceride or cholesterol from serum to liver where it is catabolized and excreted out of the body. Significantly greater increase in HDL levels was

produced by aqueous extracts than ethanolic extracts.

CONCLUSION

The aqueous and ethanolic extracts of *Blumea eriantha* DC have shown significant antioxidant activity. In the preliminary studies, it was found out that the aqueous and ethanolic extracts of *Blumea eriantha* DC have shown promising antihyperlipidemic activity. *Blumea eriantha* DC ay partly owe its antihyperlipidemic activity to its antioxidant activity.

ACKNOWLEDGEMENT

The authors thank the Director Kamla Nehru Institute of Management And Technology faculty of pharmacy, Sultanpur .for providing the facilities to carry out the work.

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