EVALUATION OF ANTI ATHEROGENIC ACTIVITY OF FLAVONOIDS (3,3',4',5-TETRA HYDROXY-6,8-DIMETHOXY FLAVONE) ISOLATED FROM Cadaba farinosa Forsk IN RAT FED WITH ATHEROGENIC DIET

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Abstract

The present investigation to decide the flavonoids isolated from Cadaba farinosa (Linn) has been screened for its antiatherogenic activity. We have isolated flavonoids by column chromatography on the methanolic extract of Cadaba farinosa. Flavonoids 1 from Cadaba farinosa were evaluated at a fixed dose of 15 mg/kg/day. The atherogenic diet (AD) is used to induce hyperlipidemia in wistar albino rats, and the plasma levels of various biochemical markers, including total cholesterol, triglycerides, LDL, VLDL, and HDL cholesterol, as well as invivo antioxidant enzymes like SOD and CAT, are then measured. 24 male Wister rats were distributed into the four groups of six rats each as follows: Standard chow diet was administered to group 1, an atherogenic diet was administered to group 2, Rats in groups 3 and 6 received atorvastatin (1.2 mg/kg B.wt.) and AD with flavonoids from Cadaba farinosa (15 mg/kg B.wt.). After an overnight fast, all rats were slaughtered at the end of three weeks via cervical dislocation. When compared to groups of rats treated with AD, the flavonoids (CF1) from Cadaba farinosa-administered rats had significantly lower body weight, plasma and tissue total cholesterol, TG, phospholipids, plasma Low density lipoprotein, and Very Low density lipoprotein, as well as higher plasma levels of HDL, SOD, and CAT. We came to the conclusion that the flavonoids (CF1) from Cadaba farinosa are a significant hypolipidemic agent with preventative and therapeutic activity against hyperlipidemia after considering the findings.

Keywords: Cadaba farinosa, Atherogenic diet, rats, flavonoids, hypolipidemia.

1. INTRODUCTION

In Western nations and Asia, coronary heart disease (CHD) is the leading cause of death. Ischemic heart disease (IHD), a type of CHD, raises the mortality rate. Globally, the number of heart patients with IHD is progressively rising. Heart disorders are responsible for 41% of deaths in the United States[1]. According to extensive epidemiological studies, elevated blood cholesterol levels are a primary contributor to coronary heart disease[2]. Many living things depend on oxidation to produce the energy needed to power their metabolic functions. However, the unchecked synthesis of oxygen-derived free radicals has a role in the development of numerous diseases, including cancer, rheumatoid arthritis, and atherosclerosis, as well as in aging-related degenerative processes[3]. By using substances like ascorbic acid, tocopherols, and glutathione, as well as enzymes like superoxide dismutase and catalase, almost all organisms are well protected against the effects of free radicals[4]. Fibrates, statins, bile corrosive sequestrants, and other commercially available effective synthetic antihyperlipidemic medications enhance the principle of regulated lipid digestion, but their adverse side effects, such as dry skin, diarrhoea, illness, and myopathy, are apparent. Inconveniently, there is a need for alternative remedial methods on everyday things in high demand for managing hyperlipidemia that are less damaging and provide better health over time. As a result, it is thought that these spices are an effective way to prevent atherosclerosis. Due to their hypolipidemic, antianginal, and other beneficial properties, a number of medicinal plants have demonstrated their beneficial impact on cardiovascular disease (CVD).

Cadaba farinosa (family Capparidaceae) is commonly known as "Indian cadaba" in ayurvedic customary framework. Quercetin, isoorientin, hydroxybenzoic acid,syringic corrosive, vanillic corrosive and 2-hydroxy-4-methoxy benzoic corrosive were separated from Cadaba farinose(6). Cadaba farinosa has been utilized for various infections like anthelmintic, antisyphilitic, aperients, energizer, antiscorbutic, antiphlogistic(7). Cadaba farinosa was utilized rheumatic pain(7). The bloom

buds are stimulant, antiscorbutic, purgative, antiphlogistic and anthelmintic particularly for round worm(8). Cadaba farinosa was utilized as hepatoprotective activity(9) . C. farinosa was utilized for the therapy of wound healing(10) and anticancer(11) . In any case, no literature are accessible on the hypolipidemic activity. Hence, the goal of the current examination to choose the antiatherogenic activities of flavonoids isolated from Cadaba farinosa in atherogenic diet fed rats.

2. MATERIALS AND METHODS

2.1 Chemicals and Reagents

All the chemicals and reagents were purchased from Sigma, SD fine chemicals and Fisher.Fisher chemicals were of analytical grade .

2.2 Gathering & Identification of Plant

The aerial parts Cadaba farinosa (family Fabaceae) were gathered form senkottai, Tirunelveli District of Tamilnadu, India. Plant identification was made from Botanical investigation of India, Palayamkottai The Cadaba farinosa were desiccated under shadowy, segregate, crushed through grinder[12].

2.3 Isolation of compounds by column chromatographic separation

The methanolic extract of Cadaba farinosa was subjected to column chromatographic separation using normal phase silica gel column. The dark brown solid (2 g methanolic extract of Cadaba farinosa) was adsorbed on silica gel (20 g) and transferred to a column of silica gel (200g equilibrated with Hexane). Elution was achieved with Hexane (100%), Hexane: CHCl3 (90:10), Hexane: CHCl3 (75:25), Hexane: CHCl3 (50:50), benzene: CHCl3 (25:75), CHCl3 (100), CHCl3: EA (75:25), CHCl3: EA (50:50), CHCl3: EA , (30:70), EA (100), EA : methanol (80:20), EA : methanol (60:40), EA: methanol (50:50), EA: methanol (25:75)and methanol(100). Fraction of 100ml were gathered without fail, refined off the dissolvable and the homogeneity of the subsequent deposits was analysed on TLC by utilizing distinctive dissolvable frameworks and comparable parts, distinguished by their TLC conduct were combined. Every single tube was investigated by TLC, with single and comparative spots were pooled together. The solvents were invalidated utilizing evaporator under vacuum.

2.4 Animals and treatment

Wistar pale skinned rats of either sex (150-200 g) was chosen and bought from Central Animal House, Sri venkateswara college of Pharmacy, chitoor, A.P. India. They were housed in rodent confines and kept in standard conditions (12h light and 12h dim cycle, 25±2 °C, 35–60% relative moistness). They were taken care of with standard chow diet and water not indispensable. The animal ethical committee approval was obtained from Ethical Committee of Sankaralingam Bhuvaneswari college of Pharmacy, Anaikuttam, Sivakasi, Tamilnadu (SBCP/2020-21/CPCSEA/IAEC/1(2)/F16/1460/ 09-12-2020).

2.5 Experimental Design

2.5.1 Hypolipidemic activity

Rats were divided into following 4 groups of 6 rats each:

Group I : Standard chow pellet

Group II : Atherogenic Diet(AD)

Group III : AD plus treated with Flavonoid I(CF1) from Cadaba farinose (15mg/kg b.wt)

Group IV : AD plus treated with Standard drug atorvastatin (1.2 mg/kg B.wt)

2.5.2 Animal diet

The compositions of the two diets were as follows(15)

Normal diet: Wheat flour 22.5%, simmered bengal gram powder 60%, skimmed milk powder 5%, casein 4%, refined oil 4%, salt blend with starch 4% and vitamin and choline blend 0.5%.

High fat diet: normal diet with coconut oil 9% and cholesterol 0.4%.

2.5.3 Assessment of hypolipidemic activities

Rats of III and IV groups were orally fed with the isolated compound from Cadaba farinosa and rats of V group were fed with standard medication atorvastatin. Both the isolated compound and atorvastatin were suspended in 2% tween 80(16) separately and nourished to the respective rats by oral intubation. Toward the end of 21 days every one of the creatures were sacrificed by cervical dislocation after overnight fasting. Liver, heart and aorta were cleared of sticking fat, weighed precisely and utilizeded for the preparation of homogenate. Creatures were sufficiently given consideration according to the Animal Ethical Committee's recommendations.

2.5.5 Biochemical estimation

Plasma samples were analyzed for TC, HDL-cholesterol and TG were estimated using Boehringer Mannheim kits by Erba Smart Lab analyzer USA. Low density lipoprotein and very low density lipoprotein were calculated by using Friedwald et al.,(1972) method(17). Ester cholesterol(18) and free cholesterol(18) were analyzed by using digitonin. Parts of the tissues from liver, heart and aorta were marked, weighed and homogenized with methanol (3 volumes). The lipid concentrates

obtained by the method of Folchet al., 1957(19).Concentrates were used for the estimation of ester cholesterol and free cholesterol, triglycerides(20) and phospholipids(21). Nichans WH et al 1968 technique was used for assessment of TBARS level(22). Another bit of tissues were homogenized with buffer solution. The concentrate were utilized for the assessment of oxidative prevention agent exercises like Kakkar P et al., 1984 strategy was utilized for the assurance of Superoxide dismutase (SOD)(23), Sinha AK et al., 1972 strategy was utilized for the assurance of Catalase (CAT)(24).

2.5.6 Statistical analysis

Results were communicated as mean ± SE of 6 rats in every group. The statistical significance between the groups was analyzed by utilizing one way analysis of variance (ANOVA), followed by Dunnet's multiple correlation test. Significance level was fixed at 0.05.

3 RESULTS

3.1 isolated compound from methanolic extract of Cadaba farinose

Fractions 56-75 eluted with CHCl3: EA, 25:75 v/v) has resulted a semi solid, assigned as CF1(210mg) and was described. The compound CF2 was discovered to be homogeneous and tested on TLC in the following solvent systems. Based on the spectral (IR, 1H & 13CNMR and MS) data, the isolated compound, which corresponds to the molecular formula deduced as C17H14O8. thus, the structure of the compound CF1 is 3,3',4',5-Tetra hydroxy-6,8-dimethoxy flavone

3.2 Effect of flavonoids I (CF1) isolated from Cadaba farinosa body weight changes in rats

As shown in Table 1. Rats in the AD group gained more body weight (64.231.46g) than control rats (19.141.14g), which was noticeably (p0.001). When compared to AD-fed rats, the treatment with flavonoids isolated from C. farinose significantly decreased body weight (p0.001) as (26.123.66g and 32.331.85g) and atorvastatin 1.2 mg/kg (20.222.20g) (Group IV) (Group II). This study established that rats fed a high-fat diet for three weeks saw a considerable rise in body weight, confirming their classification as obese[25]. When compared to rats who had received AD therapy, treatment with flavonoids I (group III) extracted from Cadaba farinosa showed a considerable reduction in body weight. This body weight loss was consistent with the findings of the prior study, which showed a dose-dependent decrease in the body weight was observed [26].

Table 1: Effect of flavonoids I isolated from Cadaba farinosa on average body weight changes in control and experimental rats

Groups	**Initial weight (g)**	**Final weight (g)**	**Average body weight gain (g)**
Group I	145.72± 2.01^{b*}	164.87± 1.24^{b*}	19.14± 1.14^{b*}
Group II	150.70± 2.23^{a*}	204.98± 2.12^{a*}	54.70± 2.24^{a*}
Group III	149.49± 2,25^{a*,b*}	175.61± 1.83^{a**,b*}	26.12± 3.66^{a*,b*}
Group IV	148.29± 2.28^{a*,b*}	168.52± 1.66^{a*,b*}	20.22± 2.20^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

NS: Non significant;

Values are mean ± SE of 6 rats

P values : *<0.001, **<0.05 ,NS : Non significant

a → group II III, IV compared with groups I.

b → group III, IV compared with groups II.

Group I : Standard chow diet (Control)

Group II : Atherogenic Diet (Negative Control)

Group III : AD + Flavonoids isolated from C. farinose (15 mg/kg b.wt)

Group IV : AD + Atorvastatin (1.2 mg/kg b.wt) (Positive Control).

Effect of flavonoids I isolated from Cadaba farinosa on plasma lipid in atherogenic diet rats

The effect of flavonoids(CF1) isolated from C. farinose on plasma lipids profile in AD rats were presented in Table 2 . Atherogenic diet fed rats showed significant increase ($p<0.001$) in plasma total cholesterol level as compared to control rats (group I). HFD intakes were shown to contribute to syndromes such as hyperlipidemia, glucose intolerance, hypertension, and atherosclerosis [27]. Treatment with flavonoids(CF1) isolated from C. farinose at the dose of 15 mg/kg body weight showed a significant ($p<0.001$) decrease in the total cholesterol level compared to AD rats (group II). Lowering total cholesterol levels considerably reduced the risk of heart attacks, strokes, and death.

The effect of flavonoids(CF1) isolated from C. farinose on plasma and tissue free and ester cholesterol were shown in Tables 2 and 3 . The significant ($P<0.001$) increase in levels of plasma and tissue free and ester cholesterol were also observed in rats fed with AD (group II) when compared control rats (group I). Both plasma and tissue free and ester cholesterol reduced remarkably on treating the AD rats with flavonoids isolated from C. farinose. This lipid lowering effect may be because of increase in elimination of fecal sterol[28].

The effect of flavonoids(CF1) isolated from C. farinose on plasma and tissue triglyceride and free fatty acids were shown in Tables 5.46 and 5.49 and Fig.5.41, 5.45. The concentration of plasma and tissue triglyceride was elevated in rats fed with AD (group II) as compared to control rats (group I). AD rats had significant increase in the level of plasma and tissue triglyceride and free fatty acids due to leads to decreased hepatic release of lipoprotein and increased esterification of free fatty acids [29]. Both plasma and tissue triglyceride levels considerably reduced in rats treated with flavonoids(CF1) isolated from C. farinose as well as standard drug atorvastatin along with AD when compared rats fed with AD (group II). Few studies suggested that flavonoids present in plants such as rutin, myricetin, and naringenin hydrate are able to regulate plasma TC and TG[30].

The effect of flavonoids(CF1) isolated from C. farinose on plasma and tissue phospholipids were shown in Tables 5.46, 5.50 and Fig. 5.41, 5.46. The concentration of plasma and tissue phospholipids considerably increased in rats fed AD (group II) when compared to control rats (group I). This may be due to decreased phospolipase activity . Both plasma and tissue phospholipids levels considerably decreased in rats treated with flavonoids(CF1) isolated from C. farinose (15 mg/kg body weight) and as well as standard drug atorvastatin along with AD in comparison with rats fed with AD (group II). The reduced concentration of phospholipids may also be due to the enhanced activity of phospholipases[31].

Table 2: Effect of flavonoids I isolated from Cadaba farinosa on plasma lipid profile in AD fed rats

Groups	**Total cholesterol (mg/dL)**	**Ester cholesterol (mg/dL)**	**Free cholesterol (mg/dL)**	**Free fatty acid (mg/dL)**	**Tri glyceride (mg/dL)**	**Phospho lipid (mg/dL)**	**Atherogenic index**
Group I	112.32± 1.41^{b*}	80.43± 0.54^{b*}	31.89± 1.15^{b*}	41.92± 0.74^{b*}	72.57± 0.88^{b*}	61.81± 0.69^{b*}	1.94± 0.03^{b*}
Group II	172.03± 0.87^{a*}	132.31± 1.03^{a*}	39.72± 0.87^{a*}	63.60± 0.80^{a*}	123.69± 0.85^{a*}	137.36± 1.03^{a*}	4.63± 0.05^{a*}
Group III	118.82± 1.04^{a*,b*}	82.38± 0.84^{a**,b*}	36.44± 1.51^{a*,b*}	43.24± 0.49^{a*,b*}	73.59± 0.92^{a*,b*}	43.24± 0.49^{a*,b*}	2.21± 0.02^{a*,b*}
Group IV	108.45± 0.99^{a*,b*}	79.32± 0.74^{a*,b*}	29.13± 1.10^{a*,b*}	39.84± 0.48^{a*,b*}	68.48± 0.74^{a*,b*}	39.84± 0.48^{a*,b*}	1.81± 0.02^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 5.45.

Table 3: Effect of flavonoids I isolated from Cadaba farinosa on tissues ester cholesterol levels in AD fed rats

Groups	Ester cholesterol (mg/g of tissue)		
	Liver	Heart	Aorta
Group I	1.85 ± 0.02^{b*}	2.38 ± 0.02^{b*}	2.13 ± 0.02^{b*}
Group II	3.45 ± 0.02^{a*}	6.61 ± 0.04^{a*}	5.94 ± 0.04^{a*}
Group III	2.37 ± 0.02^{a*,b*}	2.90 ± 0.01 ^{a*,b*}	2.38 ± 0.02^{a*,b*}
Group IV	1.90 ± 0.01 ^{a*,b*}	2.56 ± 0.02 ^{a*,b**}	2.28 ± 0.02 ^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

Table 4: Effect of flavonoids I isolated from Cadaba farinosa on tissues free cholesterol levels in AD fed rats

Groups	Free cholesterol (mg/g of tissue)		
	Liver	Heart	Aorta
Group I	0.40±0.01^{b*}	0.69±0.06 ^{b*}	0.80±0.01 ^{b*}
Group II	2.35±0.02^{a*}	1.15±0.02^{a**}	1.27±0.01 ^{a*}
Group III	0.67±0.01^{a*,b*}	0.81±0.05^{a*,b*}	0.70±0.01^{a*,b*}
Group IV	0.52±0.01^{a*,b*}	0.67±0.01^{a*,b*}	0.77±0.02^{a*,b**}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

Table 5: Effect of flavonoids I isolated from Cadaba farinosa on tissue Triglyceride levels in AD fed rats

Groups	Triglyceride (mg/g of tissue)		
	Liver	Heart	Aorta
Group I	8.30±0.07 ^{b*}	9.84±0.11^{b*}	9.67±0.13 ^{b*}
Group II	25.34±0.36 ^{a*}	46.79±0.41 ^{a**}	27.92±0.51 ^{a*}
Group III	12.48±0.17^{a*,b*}	21.44±0.36^{a*,b*}	13.34±0.28 ^{a*,b*}
Group IV	9.70±0.15 ^{a*,b*}	15.24±0.28^{a*,b*}	10.24±0.19 ^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

Effect of flavonoids I isolated from Cadaba farinosa on plasma lipoprotein in atherogenic diet fed rats

The effect of flavonoids(CF1) isolated from C. farinose on plasma HDL level in AD fed rats were shown in Table 5.51 and Fig. 5.47. The significant reduction in the HDL level in AD fed rats when compared group I control rats . A reduction in HDL concentrations in animals fed with AD may be due to the acceleration of apolipoprotein A1[32]. Treatment with flavonoids isolated from C. farinose (Group III) had considerably increased the HDL-Cholesterol level when compared to AD rats (Group II). It has clearly been demonstrated that a relationship exists between increased concentration of HDL-C and decreased morbidity-and mortality-rate in cardiovascular patients[33].

The effect of flavonoids(CF1) isolated from C. farinose on plasma LDL and VLDL-Cholesterol level in AD fed rats were shown in Table 5.51 and Fig. 5.47. The increased levels of LDL and VLDL-Cholesterol in rats fed with AD (group II) was significant (P<0.001) when compared control group of rats (group I). Atherogenic diet containing coconut oil, is rich in

saturated fatty acids, known to increase the concentration of LDL-C and monounsaturated fatty acids, which increase the concentration of serum triacylglycerols . This type of lipid has demonstrated increase in the level of serum LDL-Cholesterol and VLDL- C and lower serum HDLCholesterol[34]. Treatment of flavonoids (CF1) isolated from C. farinose (Group III) markedly reduced the level of plasma LDL-Cholesterol and VLDL-Cholesterol when compared to AD rats (group II). This effect may be due to an ability to inhibit cholesterol synthesis via competitive inhibition of HMG-CoA reductase

Table 6: Effect of flavonoids I isolated from Cadaba farinosa on plasma lipoprotein in AD fed rats

Groups	HDL cholesterol (mg/dL)	LDL cholesterol (mg/dL)	VLDL cholesterol (mg/dL)
Group I	57.75± 0.62^{b*}	33.10± 0.50^{b*}	14.51± 0.17^{b*}
Group II	37.10± 0.41^{a*}	90.34± 0.75^{a*}	24.73± 0.17^{a*}
Group III	53.49± 0.47^{a*,b*}	43.78± 0.79^{a**,b*}	14.71± 0.18^{a*,b*}
Group IV	59.63± 0.53^{a*,b*}	32.87± 0.42^{a*,b*}	13.69± 1.19^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

Effect of flavonoids I isolated from Cadaba farinosa on tissue lipid peroxidation in atherogenic diet fed rats

The effect of flavonoids(CF1) isolated from C. farinose on tissue lipi peroxidation in AD fed rats were depicted in Table 5.52 and Fig. 5.48. The elevated levels of TBARS were observed in tissues(liver, Heart, Aorta) of rats fed with AD (group II) when compared to control rats. The consumption of a HFD promotes a plasma increase of lipids that stimulates the production of reactive oxygen species (ROS) through the activation of leukocytes, inducing lipid oxidation and atherogenesis[35]. The significant reduced in the level of TBARS in rats administered with flavonoids(CF1) isolated from C. farinose(Group III) when compared to AD fed rats. This reduction of TBARS due to phenolic compounds can also act as chelating agents for metals such as iron (Fe2+) and copper (Cu2+), and can improve the endogenous antioxidant systems, inhibiting the production of ROS and contributing to protection against lipoperoxidation [36].

Table 7: Effect of flavonoids I isolated from Cadaba farinosa on tissues TBARS in AD fed rats

Groups	TBARS (n mol of MDA formed/g of tissue)		
	Liver	Heart	Aorta
Group I	23.32±0.40^{b*}	40.38±0.55^{b*}	15.64±0.26 ^{b*}
Group II	73.05±0.75^{a*}	81.51±0.34^{a**}	61.49±0.46^{a*}
Group III	30.91±0.36^{a**,b*}	44.24±0.47^{a**,b**}	27.93±0.45 ^{a**,b*}
Group IV	25.18±0.72^{a*,b*}	17.80±0.23^{a*,b*}	17.80±0.22 ^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

Effect of flavonoids I isolated from Cadaba farinosa on tissue enzymatic antioxidant in atherogenic diet fed rats

The effect of flavonoids(CF1) isolated from C. farinose on tissues SOD level were depicted in Table 5.53 and Fig. 5.49. The activities of SOD in the tissue like liver, heart and aorta, considerably (P<0.001) lowered in rats fed with AD (group II) than control group animals. AD-induced hyperlipidemia, increased cellular reactive oxygen species (ROS) played a vital role via increased oxidative stress thus decreasing antioxidant capacity. SOD are endogenous antioxidant enzymes which play an essential role in detoxification of toxic oxygen radicals[37]. Treatment of flavonoids(CF1) isolated from C. farinose (Group III) considerably increased the activities of SOD in tissues of rats when compared to AD fed rats (Group II). Whereas, administration of rutin significantly inhibited AD induced alter oxidative stress which may be due to its antioxidant potential.

Table 8: Effect of flavonoids I isolated from Cadaba farinosa on tissues superoxide dismutase in AD fed rats

Groups	SOD (unit m/mg of protein)		
	Liver	Heart	Aorta
Group I	3.60±0.60^{b*}	1.80±0.03 ^{b*}	2.69±0.02 ^{b*}
Group II	1.66±0.03^{a*}	0.77±0.01 ^{a**}	1.39±0.01^{a*}
Group III	3.15±0.02 ^{a**,b*}	1.66±0.06 ^{a*,b*}	2.51±0.02 ^{a**,b**}
Group IV	3.67±0.02^{a*,b*}	1.88±0.02 ^{a*,b*}	2.56±0.02 ^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

The effect of flavonoids (CF1) isolated from C. farinose on tissues catalase (CAT) level were depicted in Table 5.54 and Fig. 5.50. The activities of CAT in the tissue like liver, heart and aorta considerably (P<0.001) lowered in rats fed with AD (group II) than control group animals. AD treated rats had elevated oxidative stress contributes to the development of atherosclerosis-linked metabolic syndrome[38]. Administration of flavonoids(CF1) isolated from C. farinose (Group III) CAT enzymes considerably increased the activities of CAT in tissues of rats when compared to AD fed rats (Group II).

Table 9: Effect of flavonoids I isolated from Cadaba farinosa on tissues catalase in AD fed rats

Groups	CAT (μ moles of H_2O_2, consumed m/mg of protein)		
	Liver	Heart	Aorta
Group I	25.42±0.28 ^{b*}	42.15±0.60 ^{b*}	28.56±0.29 ^{b*}
Group II	13.59±0.35^{a*}	28.68±0.33 ^{a**}	18.07±021^{a*}
Group III	21.35±0.33 ^{a**,b*}	38.23±0.30^{a**,b*}	24.59±0.36^{a**,b*}
Group IV	25.72±0.31 ^{a*,b*}	45.44±0.31^{a*,b*}	29.21±0.27 ^{a*,b*}

Values are expressed as mean □ SE (n=6) P values: * < 0.001, ** < 0.05

Particulars of group I-IV are similar as in Table 1.

CONCLUSION

The current examinations affirmed that AD induced hyperlipidemic was related with flavonoids (CF1) from Cadaba farinosa decreasing plasma lipids and lipoproteins in both plasma and tissues. Likewise, treatment with the flavonoids (CF1) from Cadaba farinosa gives the protection against AD induced damage to the cardiac tissues probably through constructive modulation of the cardiac antioxidant system. We came to the conclusion that the flavonoids (CF1) from Cadaba farinosa are a significant hypolipidemic agent with preventative and therapeutic activity against hyperlipidemia and AS after considering the findings.

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Conflicts of Interest:

The authors declare no conflict of interest.

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