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EFFECT OF *PROSOPIS CINERARIA* BARK EXTRACT ON HEMATOLOGY IN HYPERCHOLESTEROLEMIC RABBITS

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ABSTRACT

Prosopis cineraria is known as a boon tree of the Thar desert by its multiple uses and its medicinal values. This study evaluated the effect of *Prosopis cineraria* (Family: Leguminosae and Subfamily: Mimosidae) bark extract on hematological alleviations with hypolipemic efficacy in hypercholesterolemic rabbits. Hypercholesterolemia was induced by orally administration of high fat diet and cholesterol powder (500 mg / Kg body weight / day). The treatment of *Prosopis cineraria* bark extract reduced lipid profile parameters *i.e.* total cholesterol up to 91.7%, LDL-cholesterol 93%, triglyceride 59% and VLDL- cholesterol 60%. Administration of *Prosopis cineraria* bark was not altered significantly hematological parameters such as TLC (Th/mm³), RBC (million/mm³), HGB (gm/dl), HCT. %, MCV (µmm³), MCH (pg), MCHC (gm/dl), Plat. (Lacs/mm³), LYM. %, MO. %, GRN. %, RDW. %, PCT., MPV (µmm³) and PDW. %. Toxicological parameters *i.e.* creatine, blood urea, SGPT and SGOT were also examined and remained under normal ranges. The results of this study indicated that *Prosopis cineraria* bark extract has potent hypolipidemic efficacy along with protective alleviations on hematology.

INTRODUCTION

Atherosclerosis is the leading cause of mortality and morbidity in modern industrialized world (Verpoorte, 1999). There are so many well-established drugs available for treatment of atherosclerosis but hidden side effects always along with them. Above this statement, motivate us to rethink about alternate and safer remedies for it. In Ayurveda, Kapha imbalance (atherosclerosis) is an underlying mechanism of heart diseases (Singh *et al.*, 2003). Ayurveda suggested for the treatment of heart diseases through promote biofire (Agni) and to clear the channels by panchakarma as well as using natural herbs that have hypolipidemic and antistress activity (Saxena *et al.*, 2004). *Prosopis cineraria* (Family: Leguminosae and Subfamily: Mimosidae) is religiously known as 'Shami' divine tree of the Thar Desert of Rajasthan, India. Ancient literature has been reported the use of *Prosopis cineraria* as a folk medicine for various ailments and known as blood purifier (Kartikar and Basu, 1984; Banjerjee and Maulik, 2002). Based on these available references, this study was conducted to evaluate effects of *Prosopis cineraria* bark extract on hematological alleviations along with hypolipidemic action in hypercholesterolemic rabbits.

MATERIALS AND METHODS

Experimental Design

The main experiment was divided into three groups. The control and treated experimental groups have usually consisted to eight animals each.

Group A: Vehicle Control or Intact Control

Group B: Hyperlipidemic Control

Group C: *Prosopis cineraria* bark extract Treatment Group

Animals

Albino male New Zealand white rabbits were used as animal model and weight and age of animals were 1.25-1.50 Kg. and 10-12 months respectively. Animal were kept in standard environmental conditions as cyclic darkness and lightness 12 hrs periods in metallic wire cages with ample space. University departmental ethical committee approved the experimental protocol.

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Induction Of Hyperlipidemia

Hyperlipidemia was induced by high fat diet and orally administration of cholesterol powder (500 mg / Kg per day per day).

Hematology

Blood was collected from the marginal veins and direct cardiac puncture. Collected blood was stored in anticoagulant containing vials at -20°C . Hematological assessments of TLC (Th/mm^3), RBC ($\text{million}/\text{mm}^3$), HGB (gm/dl), HCT. %, MCV (μmm^3), MCH (pg), MCHC (gm/dl), LYM. %, MO. %, GRN. %, RDW. %, PCT., MPV (μmm^3) and PDW. % were also examined by using auto-analyzer through standard methods (Wintrobe, 2011; Sodipo *et al.*, 2011).

Biochemistry of Serum

Plasma was separated centrifugation of blood at 3000 rpm for 10 minutes and was divided into 4 to 5 portions for different determinations. Plasma was stored at -20°C . All biochemical parameters were calculated by standard methods using auto-analyzer (Varley, 2006).

1. **Total Cholesterol:-**By test kit (CHOD-PAP; Entropic GmbH, GERMANY).
2. **Triglyceride:-**By test kit (GPO-POD;Centronic GmbH, GERMANY).
3. **LDL - Cholesterol:-** LDL Cholesterol was calculated by the Friedewald's formula (Friedewald *et al.*, 1972) as follows:

$$\text{LDL Cholesterol (mg / dl)} = \text{TC} - \text{HDL-C} - \text{VLDL-C}$$

Where VLDL cholesterol (mg / dl) = $\frac{\text{Triglyceride}}{5}$

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Statistical Analysis

All Hematological and others biochemical parameters were expressed as mean \pm SEM and analyzed statistically by using unpaired student's test.

RESULTS

Hematology

Administration of high fat diet and cholesterol powder caused hyperlipidemic status of animal model. Assessments of TLC, GRN % and MO % were non-significantly decreased in treated group (Gr. C) and also in hyperlipidemic control group, not showed any fluctuation. MCH and MCHC were slightly increased in treated group (Gr. C). Platelet count was significantly decreased in treated group but not altered in hyperlipidemic group. RDW %, PCT, RDW and PDW were not altered in treated groups as well in control groups (vehicle and hyperlipidemic). RBC, Hemoglobin (HGB), HCT were not altered in control and intact treated groups (Gr. B and C). (Table I).

Toxicological Profile Results of toxicity profile i.e. blood creatinine, Urea, total Protein, SGOT and SGPT were not altered significantly in treated groups (Gr. C) (Table II).

Lipid Profile Lipid profile was significantly ($P \leq 0.001$) influenced by administration of *Prosopis cineraria* bark extract and reductions were observed in total cholesterol up to 88%, LDL -cholesterol level up to 95%, triglyceride level up to 59 % and VLDL 60% (Table III) .

DISCUSSION

It is well established that elevated cholesterol and LDL-cholesterol level promote atherosclerosis and other cardiovascular diseases. Hypercholesterolemia is the first threatening step toward the pathogenesis of atherosclerosis (Verpoorte, 1999). In present study, the treatment of *Prosopis cineraria* bark extract showed hypolipidemic effect and protective alleviations on hematological parameters. This kind of results may be through stimulatory effects of plant sterols and phytochemicals on HMG-CoA reductase and bone

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Table 1: Hematology of *Prosopis cineraria* bark extract treated intact rabbits (Mean of 5 Values \pm SEM)

S. No.	Hematological Parameters	Control (Gr. A)	Hyperlipidemic Control(Gr. B)	<i>Prosopis cineraria</i> Bark Extract (Gr. C)
1.	TLC (Th/mm ³)	7120 \pm 4321	7226 \pm 467 ^d	6333 \pm 388 ^{d,h}
2.	RBC (million/mm ³)	6.33 \pm 0.28	6.32 \pm 0.29 ^d	6.35 \pm 0.66 ^{d,h}
3.	HGB (gm/dl)	10.32 \pm 0.42	10.55 \pm 0.27 ^d	10.37 \pm 0.59 ^{d,h}
4.	HCT. %	36.33 \pm 3.29	35.00 \pm 1.76 ^d	35.53 \pm 3.85 ^{d,h}
5.	MCV (μ mm ³)	63.20 \pm 2.89	63.50 \pm 3.12 ^d	63.7 \pm 3.65 ^{d,h}
6.	MCH (pg)	16.75 \pm 0.654	17.12 \pm 0.64 ^d	17.59 \pm 0.85 ^{d,h}
7.	MCHC (gm/dl)	27.91 \pm 2.41	27.89 \pm 2.01 ^d	28.20 \pm 1.54 ^{d,h}
8.	Plat. (Lacs/mm ³)	3.39 \pm 0.24	3.74 \pm 0.17 ^c	2.20 \pm 0.29 ^{c,g}
9.	LYM. %	38.35 \pm 3.06	38.72 \pm 3.40 ^d	36.56 \pm 3.92 ^{d,h}
10.	MO. %	10.77 \pm 0.89	11.53 \pm 0.63 ^d	11.67 \pm 0.77 ^{d,h}
11.	GRN. %	50.88 \pm 3.56	48.52 \pm 3.07 ^d	48.20 \pm 2.98 ^{d,h}
12.	RDW. %	14.56 \pm 0.66	14.40 \pm 0.34	13.99 \pm 0.48 ^{d,h}
13.	PCT.	0.02 \pm 0.001	0.02 \pm 0.002 ^d	0.02 \pm 0.002 ^{d,h}
14.	MPV (μ mm ³)	7.16 \pm 0.26	7.86 \pm 0.03 ^d	7.23 \pm 0.31 ^{d,h}
15.	PDW. %	18.45 \pm 0.51	17.17 \pm 0.38 ^d	17.61 \pm 0.42 ^{d,h}

Gr. B and C were compared with Gr. A and Gr. C was compared with Gr. B

$P \leq 0.05$	= a	$P \leq 0.05$	= e
$P \leq 0.01$	= b	$P \leq 0.01$	= f
$P \leq 0.001$	= c	$P \leq 0.001$	= g
Nonsignificant	= d	Nonsignificant	= d

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Table 2: Toxicological parameters of *Prosopis cineraria* bark extract treated Intact rabbits (Mean of 5 Values \pm SEM)

Treatment Groups		B. Sugar mg/dL	B. Urea mg/dL	S. Creatinin mg/dL	SGOT IU/mL	SGPT IU/mL	T. Protein mg/dL
Vehicle	Control (Gr. A)	116.00 \pm 14.00	33.46 \pm 2.50	1.20 \pm 0.06	64.85 \pm 6.85	85.16 \pm 8.40	7.32 \pm 0.04
Hyperlipidemic	Control (Gr. B)	156.00 \pm 5.65 ^c	31.12 \pm 3.08 ^d	1.11 \pm 0.05 ^d	104.00 \pm 10.21 ^c	109.16 \pm 4.01 ^d	7.40 \pm 0.13 ^d
<i>Prosopis cineraria</i> bark Extract (Gr. C)		116.23 \pm 10.67 ^d	36.25 \pm 3.56 ^d	1.04 \pm 0.03 ^{d,h}	63.1 \pm 5.89 ^{d,e}	62.55 \pm 7.79 ^{d,h}	6.9 \pm 1.08 ^{d,h}

Gr. B and C were compared with Gr. A and Gr. C was compared with Gr. B

P \leq 0.05	= a	P \leq 0.05	= e
P \leq 0.01	= b	P \leq 0.01	= f
P \leq 0.001	= c	P \leq 0.001	= g
Nonsignificant	= d	Nonsignificant	= h

Table 3: Lipid profile of *Prosopis cineraria* bark (70% ETOH) treated intact rabbits (Mean of 5 Values \pm SEM)

Treatment groups		CHO. (mg/ dl.)	TG. (mg /dl.)	LDL-C (mg/dl.)	VLDL (mg/dl.)
Vehicle	Control (Gr. A)	89.48 \pm 6.25	101.40 \pm 8.23	37.6 \pm 5.1	20.4 \pm 1.2
Hyperlipidemic	Control (Gr. B)	1523.59 \pm 83.66 ^c	366.72 \pm 15.23 ^c	1499.41 \pm 6.50 ^c	73.37 \pm 2.38 ^c
<i>Prosopis cineraria</i> Extract(Gr. C)	Bark	177 \pm 10.34 ^{a,g}	147.2 \pm 9.56 ^{a,h}	85 \pm 5.83 ^{b,g}	29.4 \pm 2.42 ^{a,g}

Gr. B and C were compared with Gr. A and Gr. C was compared with Gr. B

P \leq 0.05	= a	P \leq 0.05	= e
P \leq 0.01	= b	P \leq 0.01	= f
P \leq 0.001	= c	P \leq 0.001	= g
Nonsignificant	= d	Nonsignificant	= h

marrow (Ginsberg and Goldberg, 1987). Therefore, it produce improvements in lipids profile through reductions from hyperlipidemic status. Hematological assessments of RBC, TLC, RDW, PCT and MPV were not altered significantly. These hematological assessments indicated that this herbal part not produce adverse effect on morphology of blood corpuscles (Shapiro and Greenfield, 1987). Blood glucose was

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also reduced that it may hypoglycemic action of phytochemicals present in plant extract (Saxena and Vikram, 2004; Trivedi *et al.*, 2004). MCH, MCHC and hemoglobin content were not significantly altered; this may be due to antianemic nature of herbal part (Toky, 1999; Sodipo *et al.*, 2011). The toxicity profile parameters also remained under normal ranges. It also supported the non-toxic nature of *Prosopis cineraria* bark. Complete experimental study of treatment of *Prosopis cineraria* bark was not produce adverse effects on hematological parameters along with hypolipidemic action on lipid profile.

Conclusions

Based on the results of obtained in this study, it can be concluded that *Prosopis cineraria* bark extract has hypolipidemic efficacy along with non toxic nature and without interfering hematology in hypercholesterolemic rabbits.

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