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Anti-Hyper Lipidemic activity of *Picrorhiza kurroa* Royle ex Benth Roots

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Abstract

Hyperlipidemia is the greatest risk factor of coronary heart disease. Currently available hypolipidemic drugs have been associated with number of side effects. Herbal treatment for hyperlipidemia has no side effects and is relatively cheap and locally available. Based on high Glycoside content in herbal plants, *Picrorhiza kurroa* was selected and the present study focus on the anti-hyperlipidemic activity. The alcoholic,chloroform and aqueous root extracts of *Picrorhiza kurroa* Royle ex Benth were screened for its antihyperlipidemic activity in Triton wr-1339 induced albino rats. Atorlip-20 was used as reference standard. The results showed significant decrease in triglyceride and cholesterol level when compared with the hypolipemic groups by using different dose: low (50mg/kg), high (200mg/kg) and standard Atorlip-20(4mg/kg bw) and by treating for 7 hr and 24 hr.

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INTRODUCTION

Hyperlipidemia has been ranked as one of the greatest risk factors contributing to the prevalence and severity of coronary heart diseases. Coronary heart disease, stroke, atherosclerosis and hyperlipidemia are the primary cause of death. Hyperlipidemia is characterized by elevated serum total cholesterol and low density and very low-density lipoprotein cholesterol and decreased high-density lipoprotein levels. Hyperlipidemia associated lipid disorders are considered to cause

atherosclerotic cardiovascular disease. Among these hypercholesterolemia and hypertriglyceridemia are closely related to ischemic heart disease . The main aim of treatment in patients with hyperlipidemia is to reduce the risk of developing ischemic heart disease or the occurrence of further cardiovascular or cerebrovascular disease [9,10,11,12] . Currently available hypolipidemic drugs have been associated with a number of side effects. The consumption of synthetic drugs leads to hyperuricemia, diarrhea, nausea, myositis, gastric irritation, flushing, dry skin and abnormal liver function [9,10,11,12]. Medicinal plants are used for various research purpose. It has been reported that traditional systems have immune potential against various diseases. More than thirteen thousand plants have been studied for various pharmacological properties. An herbal treatment for hypercholesterolemia has no side effects and is relatively cheap, locally available. They are effective in reducing the lipid levels in the system. Hyperlipidemia is classified into a primary and a secondary type, which indicates the complexities associated with disease. The primary disease may be treated by anti-lipidemic drugs but the secondary type originating from diabetes, renal lipid nephrosisorhypothyroidism demands the treatment of the original disease rather than hyperlipidemia . Consumption of much fat may lead to the production of extra VLDL, resulting in the formation of large amounts of LDL which may stick to the walls of the blood vessels if the quantity of HDL is insufficient, causing blockages for the normal flow of blood. Therefore, improvement in human diet is highly recommended for disease prevention. Medicinal plants play a major role in hypolipidemic activity.

***Picrorhiza kurroa* Royle ex Benth**

(f-Scrophulariaceae) a trailing perennial herb, commonly known as kutki is widely distributed in the alpine Himalayas, from Kashmir to Sikkim at an altitude of 2500 to 4500m[1]. Mostly rhizomes and roots are used in Indian traditional medicine for the treatment of various ailments. Rhizomes and roots are valuable bittertonic,stomachic antidiarrhoeal, cholagogue, hepatoprotective, antipyretic, in small dose the powder root acts as anthelmintic and laxative. It also used in jaundice, intermittent fever, dyspepsia and skin disease cardiotonic, urinary discharge, asthma, blood troubles, burning sensations and leucoderma [3,7,8]. The present study is aimed for evaluating the anti-hyperlipidemic activity of alcoholic extracts of Picrorhiza roots in Triton wr-1339 induced albino rats.

EXPERIMENTAL

Plant material

The roots of *Picrorhiza kurroa* (f-Scrophulariaceae) was collected from the Yukka Enterprises Bombay and indentified by E.R. Nayar, NBPGR Pusa Campus, New Delhi. A voucher specimen of crude plant sample is preserved in National Herbarium of cultivated plants NBPGR New Delhi.

Extraction

The air dried coarse powder of roots (1.5 kg) was extracted with ethanol, chloroform and water. The ethanolic extract was distilled off at low temperature under reduced pressure. Alcoholic, chloroform and aqueous extract were screened for the antihyperlipidemic activity.

Animals

Wistar strains of albino rats (150-180 g each) maintained under standard animal housing conditions were used for all sets of experiments performed on 6 rats each.The rats were allowed to take standard laboratory feed with water and standard pelleted laboratory animal diet. Study was performed according to the guidelines of Institutional Animal Ethics Committee (IAEC) constituted as per the guidelines of committee for purpose of control and supervision of experiments on animals (CPCSEA), New Delhi, India

Screening of Antihyperlipidemic activity

Triton, a surfactant was used to induce hyperlipidemia [4,5]. Blood was evaluated for lipid levels after 7 hrs and 24 hrs of triton injection. Hyperlipidemia was induced in all the groups except Group1 by subcutaneous injection of Triton (200mg/kg bw).Rats were divided into five groups. Group-I, Normal control Group of Rats were given food and water, Group-II (untreated) hyperlipidemic control group received only the vehicle. Group-III were treated with Triton and Group-IV India, Group-V, Group-VI received alcoholic extract, chloroform extract and Aqueous extract of *P. kurroa* 50 and 200mg/kg, respectively. Group-VII received Atorlip-20 (4mg/kg b.w) standard drug.

Statistical analysis

Results have been shown as mean ± SEM. All statistical analysis was performed by Jandel Sigma stat 2, statistical software. Significance of difference between two groups was evaluated using students *t*-test [6]. For multiple comparisons, one-way analysis of variance (ANOVA) was used. When ANOVA showed significant difference, post-hoc analysis was performed with Tukeys test. $P < 0.05$ was considerd statistically significant.

Table No.1: Effect of chloroform, alcoholic and aqueous extracts of *Picrorhiza kurroa* and Atorlip-20 on plasma total cholesterol levels (mg/dl in plasma) and triglyceride in Triton-induced hyperlipidaemic rats 7 h after treatment.

S. No	Lipid parameter	Control Gp.	Hyperlipidaemic Gp.	Hyperlipidaemic Gp. + dried chloroform extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + dried alcoholic extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + dried aqueous extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + Atorlip-20 (Standard Drug)
				Low Dose	High Dose	Low Dose	High Dose	Low Dose	High Dose	
1	Total cholesterol	64.99 ±0.68	131.18 ±2.53	130.52 ±1.05	84.72 ±2.51	129.31 ±1.11	81.02 ±2.78	130.45 ±1.82	82.05 ±2.22	71.67 ±1.54
	Significant/ Not significant	-	-							
2	Triglyceride	74.90 ±1.48	563.59 ±2.55	561.64 ±1.90	248.68 ±1.84	560.33 ±2.44	240.59 ±1.46	560.48 ±2.36	245.62 ±3.11	127.77 ±2.23
	Significant / Not significant	-	-							

Values are mean ± S.E.M. from six animals in each group. * $P < 0.05$.

Table No.2: Effect of chloroform, alcoholic and aqueous extracts of *Picrorhiza kurroa* and Atorlip-20 on plasma total cholesterol levels (mg/dl in plasma) and triglyceride in Triton-induced hyperlipidaemic rats 24 h after treatment.

S. No	Lipid parameter	Control Gp.	Hyperlipidaemic Gp.	Hyperlipidaemic Gp. + dried chloroform extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + dried alcoholic extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + dried aqueous extract of *Picrorhiza kurroa*		Hyperlipidaemic Gp. + Atorlip-20 (Standard Drug)
				Low Dose	High Dose	Low Dose	High Dose	Low Dose	High Dose	
1	Total cholesterol	72.93 ±2.33	265.05 ±2.06	240.44 ±1.98	91.36 ±1.45	232.33 ±2.08	89.24 ±1.52	238.48 ±2.96	90.38 ±1.68	82.80 ±1.65
	Significant/ Not significant	-	-							
2	Triglyceride	90.90 ±1.97	497.09 ±3.01	492.62 ±2.97	309.68 ±2.94	489.51 ±3.73	304.72 ±3.06	491.64 ±3.86	308.86 ±2.99	147.36 ±2.41
	Significant / Not significant	-	-							

Values are mean ± S.E.M. from six animals in each group. * $P < 0.05$.

RESULT & DISCUSSION:

After 7 hours of treatment the Hyperlipidaemic group's(HG) + Picrorhiza kurroa plant extract high dose (81.02±2.78) & Hyperlipidaemic group's + Atorlip-20 (Standard Drug) (71.67±1.54)shows significant difference with the Hyperlipidaemic control group's(131.18±2.53). The high dose (200mg/kg) of plant extract was significantly decrease the cholesterol level & triglyceride level in hyperlipemic rats when compared with hyperlipemic control group's where as low dose (50mg/kg) of plant did not decrease the cholesterol level & triglyceride level in hyperlipemic rats . Alcoholic extract showed comparatively good significant result when compared to the negative control group. Among all the three extract alcoholic extract proved to be most significant in the treatment of Hyperlipidemia.

After 24 hours of treatment the Hyperlipidaemic group's + Picrorhiza kurroa root extract low dose (232.33±2.08), Hyperlipidaemic group's + Picrorhiza kurroa root extract high dose (89.24±1.52) & Hyperlipidaemic group's + Atorlip-20 (Standard Drug) (82.80±1.65) showed significant difference with the Hyperlipidaemic control group's(265.05±2.06). The high dose (200mg/kg) of root extract was significantly decreased the cholesterol level & triglyceride level in hyperlipemic rats when compared with hyperlipemic control group's where as low dose (50mg/kg) of root extract was also decreased the cholesterol level only.

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