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Research Article

Evaluation of Pharmacological Effects of Bauhinia Vaeriegata Linn on Non-Alcoholic Fatty Liver Disease in High-Fat Diet-Induced Experimental Rats

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ABSTRACT

Non-alcoholic fatty liver disease (NAFLD) is one of the most prevalent chronic liver disorders worldwide and is strongly associated with obesity, insulin resistance, dyslipidemia, and type 2 diabetes mellitus. The present study was designed to evaluate the therapeutic potential of methanolic extract of Bauhinia variegata (MBV) against high-fat diet (HFD)-induced NAFLD in experimental rats. Bauhinia variegata is presence of phytoconstituents such as alkaloids, flavonoids, tannins, saponins, glycosides, and phenolic compounds. The powdered plant material was extracted using methanol in a Soxhlet apparatus. NAFLD was induced in rats by administration of a high-fat diet for 35 days. Animals were divided into five groups: normal control, disease control, standard control (Atorvastatin 20 mg/kg), test group I (MBV 200 mg/kg), and test group II (MBV 400 mg/kg). Biochemical parameters including liver function tests (ALT, AST, ALP), lipid profile (HDL, LDL, total cholesterol, triglycerides), body weight, food intake, water intake, and histopathological analysis of liver tissue were evaluated. The findings suggest that Bauhinia variegata possesses significant hepatoprotective and antihyperlipidemic activity against HFD-induced NAFLD, possibly due to its antioxidant and anti-inflammatory properties. Thus, the plant extract may serve as a promising natural therapeutic agent for the management of NAFLD.

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is a prevalent and increasingly significant liver

disorder characterized by the accumulation of fat in the liver (steatosis) in individuals who consume little or no alcohol.¹ Non-alcoholic fatty liver disease (NAFLD) has evolved from a relatively

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unknown disease to the most common cause of chronic liver disease worldwide.² Currently, a consensus defines NAFLD as an umbrella term for a range of diseases in which steatosis is present in more than 5% of hepatocytes with metabolic risk factors (especially obesity and type 2 diabetes), excluding excessive alcohol consumption or other chronic liver disease.³ NAFLD is fast becoming one of the most common causes of chronic liver disease worldwide, and is now a major cause of liver-related morbidity and mortality. The symptoms are usually associated with features of metabolic syndrome, such as obesity, dyslipidemia, type 2 diabetes and hypertension. However, the pathogenesis of NAFLD is unknown, and this has become a hindrance to the treatment of NAFLD.⁴

Insulin resistance (in body and adipose tissue) increases the release of free fatty acids (FFA) from adipose tissue. These excess FFAs enter the liver, leading to triglyceride accumulation → this causes fatty liver (steatosis).⁵ Insulin resistance also increases SREBP-1c and ChREBP, which stimulate more fat synthesis in the liver, worsening fat accumulation. As fat builds up, the liver becomes insulin resistant, further increasing glucose and insulin levels → a vicious cycle.⁶ Excess liver fat generates inflammation and oxidative stress causing: Activation of hepatic stellate cells and Hepatocellular injury and

NAFLD.⁷ Alkaloids present in *Bauhinia variegata* linn shows Wound healing, inflammation, Antioxidant, liver disorders, stomach disorders, Jaundice. Major constituents are Carbohydrates, glycosides, alkaloids, Saponins, Tannins, Flavonoids, Phenolic compounds and traditional uses^{8,9}: Pharmacological actions: Hepatoprotective, Anti-diabetic, wound healing, anti-diarrhoeal, anti-ulcer activity.¹⁰ Therefore to investigate the therapeutic effects of *Bauhinia variegata* (Kachnar) extract in ameliorating non-alcoholic fatty liver disease (NAFLD) in high-fat diet- induced experimental rats. To explore the histopathological changes in liver tissue to determine the extent of liver damage and the potential hepatoprotective effects of *bauhinia variegata*.

Material and Methods

Bauhinia variegata were collected and dried. The powdered plant material of *Bauhinia variegata* was packed into a thimble and placed in the Soxhlet apparatus, after which methanol was used as the extracting solvent.

Experimental method:

All the animals used in the experiment were approved by the Institutional Animal Ethics Committee (IAEC).

Table 1: Experimental Design

Group n=6	Dose	Duration
Normal control	Saline p.o.	49 days
Disease control	High fat diet (HFD) 10ml/kg orally	49 days
Standard control	Atorvastatin 20mg/kg+HFD orally	HFD-1-35 days, Atorvastatin-35-49days



Test- 1	MBV 200mg/kg	HFD-1-35 days, MBV-35-49days
Test -2	MBV 400mg/kg	HFD-1-35 day MBV-35-49days

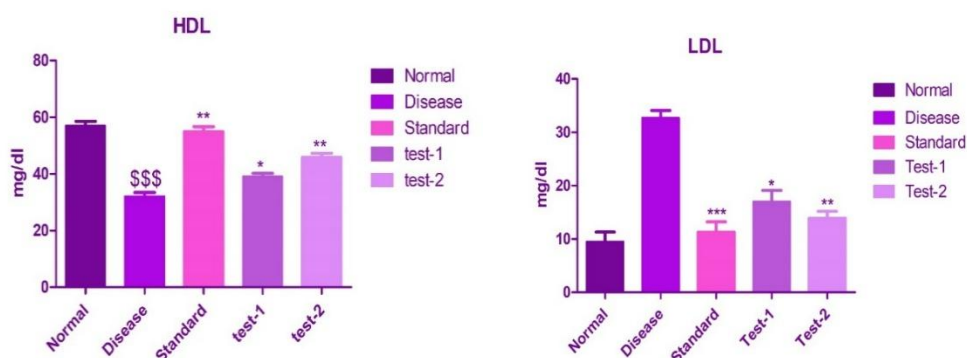
The disease model were induced in animals by administering a high-fat diet. The diet were carefully prepared by combining specific ingredients, including corn oil (400 g), sucrose (150 g), total milk powder (80 g), lard (100 g), egg yolk (200 g), sodium deoxycholate (10 g), tween 80 (36.4 g), propylene glycol (31.1 g), vitamin mixture (2.5 g), cooking salt (10 g), mineral mixture (1.5 g), and distilled water (300 mL). All components were thoroughly mixed to ensure uniformity before being provided to the test animals.

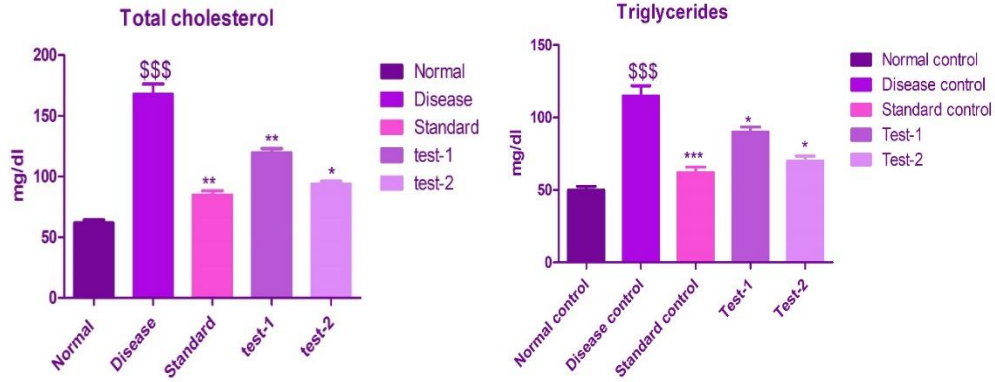
Evaluation Parameter:

Sr.No.	Evaluation Parameter
1.	Daily parameter- Food intake, water intake
2.	Weekly parameter- Body weight
3.	Biochemical parameter- Liver function test: ALT, AST, ALP Lipid profile test: HDL, LDL, TG, TC
4.	Histopathological analysis of liver tissue- H&E Staining

Results And Discussion:

1. EFFECT OF *B.VARIEGATA* ON LIPID PROFILE OF ANIMALS:

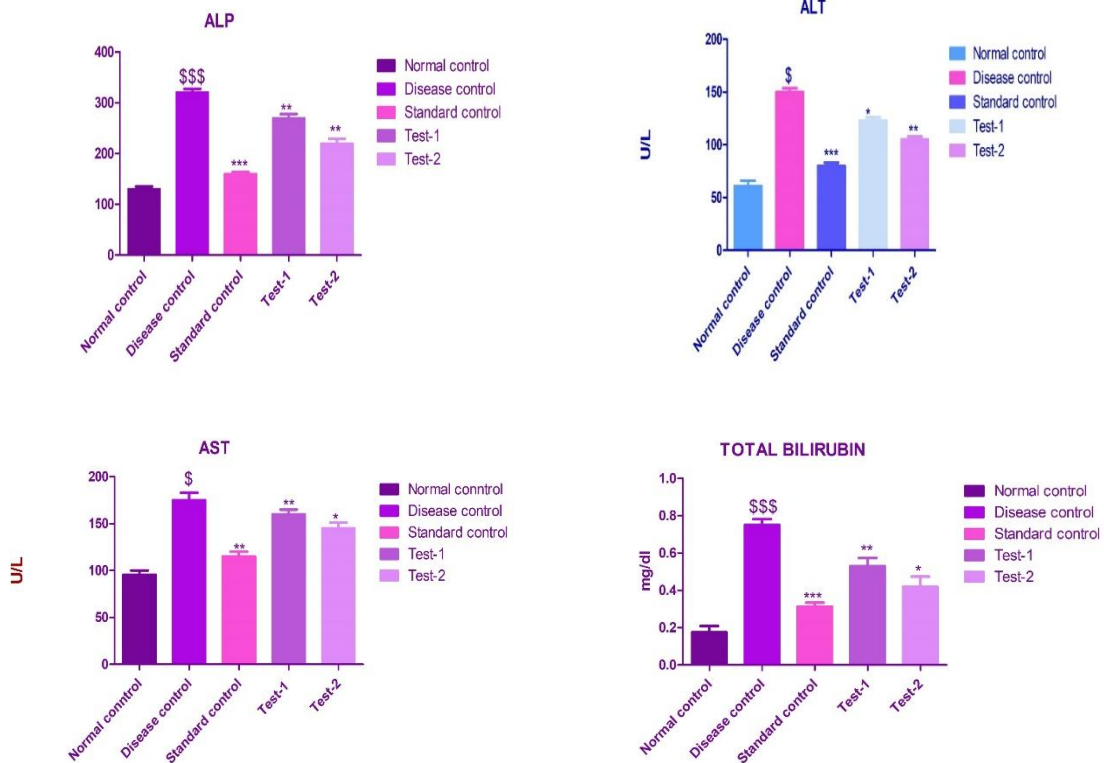


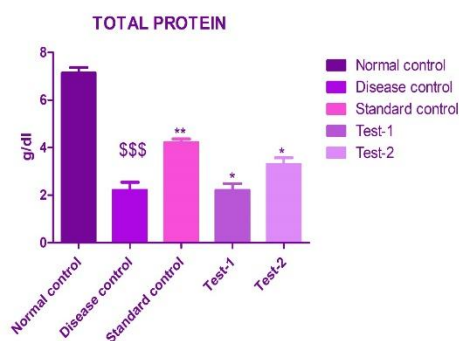


The levels of LDL was significantly increased in the disease group while HDL is decreased in disease group compared to the normal group. The levels of total cholesterol and truglycerides was significantly increased in the disease group

compared to the normal group. Statistical significance denoted as (*- $p < 0.05$, **- $p < 0.01$ and ***- $p < 0.001$ compared to the disease control group.

2. EFFECT OF *B. VARIEGATA* ON LIVER ENZYME LEVEL OF ANIMALS:





The levels of ALP and ALT was significantly increased in the disease group compared to the normal group. The levels of AST and total bilirubin was significantly increased in the disease group compared to the normal group while level of total protein was decersead in the disease group compared to the nnormal group. Statistical significance denoted as (*- $p < 0.05$, **- $p < 0.01$ and ***- $p < 0.001$ compared to the disease control group.

CONCLUSION

High-fat diet feeding resulted in metabolic disturbances such as increased body weight, altered lipid profile, elevated liver enzyme levels, and reduced antioxidant enzyme activity, indicating successful induction of NAFLD. However, treatment with the plant extract significantly improved these parameters. Therefore, the results of this study suggest that the plant extract has promising therapeutic potential in the prevention and management of NAFLD. However, further studies are required to elucidate the exact molecular mechanisms responsible for its protective effects and to evaluate its safety and efficacy in clinical settings. In conclusion, the plant extract may serve as a potential natural therapeutic agent for the management of non-alcoholic fatty liver disease.

REFERENCES

1. Pouwels S, Sakran N, Graham Y, Leal A, Pintar T, Yang W, et al. Non-alcoholic fatty liver disease (NAFLD): a review of pathophysiology, clinical management and effects of weight loss. BMC Endocrine Disorders [Internet]. 2022 Mar 14;22(1).
2. Ahmed A, Wong RJ, Harrison SA. Nonalcoholic fatty liver disease review: diagnosis, treatment, and outcomes. Clin Gastroenterol Hepatol. 2015;13(12):2062–70.
3. Machado MV, Diehl AM. Pathogenesis of nonalcoholic Steatohepatitis. Gastroenterology. 2016;150(8):1769–77.
4. Nasr P, Ignatova S, Kechagias S, Ekstedt M. Natural history of nonalcoholic fatty liver disease: a prospective follow-up study with serial biopsies. Hepatol Commun. 2018;2(2):199–210.
5. Nasr P, Ignatova S, Kechagias S, Ekstedt M. Natural history of nonalcoholic fatty liver disease: a prospective follow-up study with serial biopsies. Hepatol Commun. 2018;2(2):199–210.
6. Browning JD, Szczepaniak LS, Dobbins R, Nuremberg P, Horton JD, Cohen JC, et al. Prevalence of hepatic steatosis in an urban population in the United States: impact of ethnicity. Hepatology (Baltimore, Md). 2004;40(6):1387–95.
7. Raj Kapoor B, Jayakar B, Muruges N, Sakthisekaran D. Chemoprevention and cytotoxic effect of Bauhinia variegata against N-nitrosodiethylamine induced liver tumors



- and human cancer cell lines. *J Ethnopharmacol* 2006; 104: 407- 409
8. Balamurugan G and Muralidharan P. Antiobesity effect of *Bauhinia variegata* bark extract on female rats fed on hypercaloric diet. *Bangladesh J Pharmacol* 2010; 5: 8- 12.
 9. Sharma RK, Rajani GP, Sharma V, Komala N. Effect of ethanolic and aqueous extracts of *Bauhinia variegata* Linn. on gentamicin-induced nephrotoxicity in rats. *Ind J Pharm Edu Res* 2011 ; 45(2):192-198.
 10. Surendra BH and Alpana R. Hepatoprotective properties of *Bauhinia variegata* bark extract. *The Pharmaceutical Society of Japan* 2007; 127(9): 1503-1507.

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