



**SOKA IKEDA COLLEGE OF ARTS AND SCIENCE FOR WOMEN**  
(Affiliated to the University of Madras)  
Chennai 600 099, Tamilnadu.

**3.3.1. Number of research papers published per teacher in the Journals as notified on UGC CARE list during the last five years**

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## Research article (Award paper)

### Effect of gallic acid and *Terminalia chebula* on hepatic oxidative stress markers of high fat diet induced hyperlipidemic mice

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#### ABSTRACT

**Introduction and Aim:** Hyperlipidemia is caused due to lipid abnormalities leading to lipid peroxidation which causes extensive damage to hepatic tissues. The aim of the study is to induce hyperlipidemia in mice using high fat diet (HFD) and to estimate the effect of gallic acid and *Terminalia chebula* in reducing hepatic oxidative stress caused by hyperlipidemia.

**Materials and Methods:** 36 C57BL/6J Male 18 ± 3 g was divided into four groups; group I (6): received normal diet for 16 weeks, group II (10): High fat diet (HFD) + 0.5% CMC, group III (10): received HFD + gallic acid (50mg/Kg/b.wt) and group IV (10): HFD + *T. chebula* (250mg/kg/ b.wt) only normal diet for 15 weeks. Tissue samples from liver were taken for determination of reduced glutathione (GSH) levels catalase (CAT), super oxide dismutase (SOD) and Lipid peroxidase (LPO).

**Results:** The data revealed that feeding the HFD diet significantly raised final body weight and caused hyperlipidemia, which elevated oxidative stress markers. The treatment given to mice HFD + *T. chebula* (250mg/kg) group IV showed significant increase in antioxidant enzymes and reduced acid reactive substances in blood GSH (47 % p<0.001), CAT (80 % p<0.001), SOD (55 % p<0.001) & LPO (48 % p<0.001) than mice of group III HFD + gallic acid (50mg/Kg/b.wt) GSH (32 % p<0.001), CAT (40 % p<0.001), SOD (31 % p<0.001) & LPO (38 % p<0.01).

**Conclusion:** High fat diet-induced hyperlipidemia is coupled with increased hepatic oxidative stress, which is characterized by a decrease in antioxidant enzymes activity and increased lipid peroxidation is being more effectively treated by *T. chebula* powder than gallic acid (pure compound).

**Keywords:** *Terminalia chebula*; hyperlipidemic activity; oxidative stress markers.

#### INTRODUCTION

Hyperlipidemia is a lipid metabolic condition that has been linked to the development of cardiovascular and liver illnesses, which are the leading causes of mortality and disability globally. Hyperlipidemia is becoming more common across the world as a result of poor eating habits, obesity, and physical inactivity (1). Hyperlipidemia is a condition in which the concentration of cholesterol or triglyceride-carrying lipoproteins in the plasma exceeds a predetermined normal limit (2).

Hyperlipidemia is a condition in which excessively high amounts of any or all lipids in the blood contribute significantly to total plasma triglyceride levels and/or lipoproteins. LDL carries about 70% of total plasma cholesterol but lipids including fatty acids, cholesterol, very little triglycerides. HDL contains about 20% to 30% phospholipids and others are found from exogenous of plasma cholesterol. Hyperlipidemia is considered to be major risk factors for atherosclerosis, myocardial infarction, heart attacks, stroke, liver diseases and cerebrovascular diseases (3).

Cell membranes, lipoproteins, and other lipid-containing structures are all susceptible to lipid

peroxidation. This process has the potential to alter the normal function of cells. Lipid peroxidation is linked to a number of human illnesses, including cancer, vascular sclerosis, and ageing (4).

Research works demonstrated that feeding rats an HFD also induces hepatic steatosis and causes liver damage (5). ALT and AST were believed to be the widely used serum enzyme biomarkers for assessing liver injury during HFD induced disease models (6). A significant positive correlation has been observed between BMI and oxidative stress biomarkers. Activities of the antioxidant enzymes, Cu-Zn superoxide dismutase (SOD) and glutathione peroxidase (GPx) were found to be lower in obese subjects compared to those of nonobese controls (7). Gallic acid (GA) is a component of naturally occurring gallic acid esters, which are part of the gallotannins, a broader group of plant polyphenols. Polyphenolic substances present in legumes, vegetables, fruits, and beverages are called gallotannins (8). Anticancer, antioxidant, antibacterial, and cardio-protective properties have all been documented for gallotannins (9, 10). Gallotannins' antihyperglycemic, lipid-lowering, and antioxidant properties have all been investigated in recent years (11, 12).

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