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THE CARDIO-PROTECTIVE ACTIVITY OF ALANGIUM SALVIFOLIUM.L (WANG) OF LIPIDS PROFILE AND HISTOLOGICAL CHANGES IN ISOPROTERENOL INDUCED MYOCARDIAL INFARCTION IN RATS

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ABSTRACT Herbal medications are commonly used for neutral purposes; incorporate the treatment of cardiovascular conditions. Considering the sustainable medicinal benefits of *Alangium Salvifolium* leaves aqueous and ethanol extracts of the present study aimed to make clear the cardio-protective effects of *Alangium Salvifolium* leaf extracts on isoproterenol-induced myocardial infarction in rats. Advanced administration of *Alangium Salvifolium* leaf extracts at 400 mg/kg of body weight was found to smaller the effect of isoproterenol on the levels of Total cholesterol, Triglycerides and free fatty acid, phospholipids, VLDL, LDL with a parallel rise in the level of HDL. The *Alangium Salvifolium* plant extracts sequel was estimated with standard drug Atrovastin 40 mg/kg which also proposes similar protection and it was histological changes of the heart. Hence our present study indicated a significant cardio-protective activity of leaf extracts due to the presence of phytochemicals and antioxidant properties.

KEYWORDS : Isoproterenol, Cvd, Hdl, Ldl, Tgl, Alangium Salvifolium Leaf

1. INTRODUCTION

Cardiovascular diseases (CVDs) endure the most important global cause of death, with the World Health Organization expect that 8,760,000 people died due to myocardial infarction and ischemic heart disease in 2015 [1].Cardiovascular diseases (CVD) are the leading causes of death without being affected by several advancements in medical interventions. Among these, the ischemic heart diseases, acute myocardial infarction (MI) in particular, is one of the most disturbing values [2].

Cardiovascular disease is a class of ephemerality and vigor of diseases that involve the heart or blood vessels suddenly affect to unpredicted loss of heart function or heart attack in the vessels (arteries, capillaries, veins) [3]. It has been reported that excessive consumption of saturated fatty food poses a cardiovascular health risk [4]. Hyperlipidemia is a condition related to an increased level of lipids and cholesterol in the plasma leading to various disorders including coronary artery disease. Hyperlipidemia is a highly predictive risk factor for atherosclerosis, myocardial infarction coronary artery disease and cerebrovascular disease [5]. Dyslipipoproteinemia is an independent risk factor for the development of coronary artery diseases, myocardial infarction, and hypertension in hypolipidemic patients [6].

Hyperlipidemia is a condition of excess fatty substances called lipids, largely cholesterol and triglycerides in the blood. The extra amount of lipid circulates in the blood attached to the protein and this condition is known as hyperlipoproteinemia. During the circulation, the fatty substances remain [7].

Lipids are oily substances and fatty content not dissolved in water. Lipid mixed with fatty acid molecules as well as cholesterol is a steroid and supplemental substances in fat-soluble vitamins. The saturated and unsaturated in two types of fatty acid presented. Hydrogen atom for each carbon atom in the molecules is saturated, one carbon to another carbon atom or double bond in unsaturated [8].

Herbs have been used for medical purposes, but their usage carries on with even nowadays. It is estimated that about 25% of currently new protect medications are derived from plants used in traditional medicine, and according to a recent survey, 1 of every 5 persons in the United States has taken some herbal or dietary supplementation during his or her life. *Alangium Salvifolium* (L.f.) Wang (Alangiaceae) is a small shrub or small tree leaves that is used in native medicine [9]. Many bioactive phytochemicals such as several flavonoids, phenolic compounds, iridoid glycosides have been isolated by phytochemical screening of it [10]. In vivo studies have demonstrated that treating obese animal models with antioxidant agents attenuates the development of hyperlipidemia, myocardial infarction, and diabetes

2.0 MATERIALAND METHODS

2.1 COLLECTION AND IDENTIFICATION OF PLANT MATERIALS

The plant materials used for the present study were collected from Valukupparai belonging to Coimbatore district, Tamilnadu. The plant was identified and authenticated by the Botanical Survey of India, Tamilnadu, and Coimbatore.

2.2 ANIMALS:

Twenty-five animals were used in Male Wister albino rats weighing (150-250 g) were used for the Cardiac toxicity study at 32 days. Animal house facility of Animals was housed in well-ventilated room (temperature 23 ± 2°C, humidity 65-70%, and 12h light/dark cycle) at Central Animal House Kongunadu Arts and Science College, Coimbatore. Animals were fed with standard pellet diet and *water ad libitum*. All laboratory procedure involving laboratory animal use were followed in accordance to the institutional animal ethical committee and written permission from in house ethical committee has been taken to carry out (ethical approved no: 659/PO/S/02/CPCSEA) and complete this study.

Table1.The experimental protocol: The randomly dived five groups with five rats in each group.

Group 1	control group
Group 2	Cardiac toxicity induced - 85 mg/kg of isoproterenol in the toxicity induced in 31st and 32nd day
Group 3	Pre-treated of *AS* Leaf crude aqueous extract at dose of 400 mg/ kg.b.wt + Cardiac toxicity induced in 31st and 32nd day
Group 4	Pre-treated of *AS* Leaf crude ethanol extract at dose of 400 mg/ kg.b.wt + Cardiac toxicity induced in 31st and 32nd day
Group 5	40 mg/kg of Atrovastin + Cardiac toxicity induced in 31st and 32nd day

2.3 INDUCTION

At the end of the treatment that a day all the four groups of animals induced and except the control group. Were administrated isoproterenol (ISO) 85 mg/kg In the ISO injections for two consecutive days on the 31st and 32st days at a twenty- four hour to the myocardial injury [11]

2.4 COLLECTION AND PREPARATION OF BLOOD SAMPLES

At the end of the period of animals were sacrificed by decapitation. Blood samples were collected into a centrifuge tube. The blood was allowed to clot at room temperature for 5 min. The Blood was after centrifuged at 2500 rpm for 10 min a clean micropipette was used to carefully collect the serum and dispensed into a clean labeled specimen bottle.

2.5 HEART TISSUE HOMOGENATE

The heart was excised immediately and immersed in physiological saline. It was suspended in 10% ice-cold 0.1 M phosphate buffer (PH

7.4) and cut into small pieces. The required amount was weighted and homogenate using a Teflon homogenizer.

2.6 METHODOLOGY

Estimation of Total Cholesterol [12]. Triglycerides [13], Free Fatty Acids [14]. Phospholipids[15]., HDL- Cholesterol [16], VLDL [17], LDL [17].

2.7 HISTOPATHOLOGICAL STUDIES

The heart tissue of sacrificed rats was carefully dissected out. After rinsing in normal saline the tissue was fixed in 10% formalin-saline dehydrated with 100% ethanol solution and embedded in paraffin. Then it was cut into 4-5µ thick sections stained with hematoxylin-eosin and observed under a microscope (magnification power-400X).

2.8 STATISTICAL ANALYSIS

All the data acquired was expressed as mean ± SD. Statistical analysis was achieved by using the method of dissemination statistics (standard descriptive analysis) and analysis of means

(Paired samples T-test). Data were considered significant at $p < 0.05$. Computer software SPSS version 17.0 analyzer was used for analysis.

3.0 RESULTS AND DISCUSSION

The lipid profile studied in cardiovascular disease patients includes total cholesterol, Triglycerides, free fatty acid, phospholipids, HDL-cholesterol, VLDL- cholesterol and LDL-cholesterol the results that are obtained are given in the figure as following under each of its respective topics.

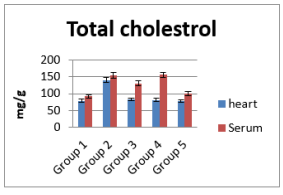

Fig 1-Total cholesterol

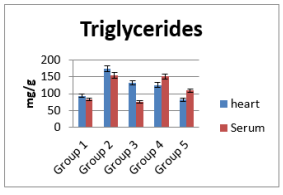

Fig 2-Triglycerides

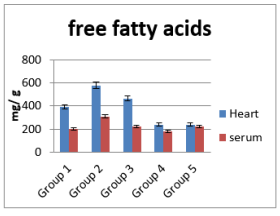

Fig 3-free fatty acid

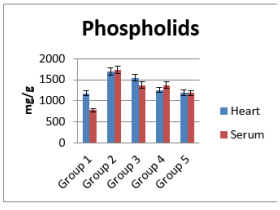

Fig 4- Phospholipids

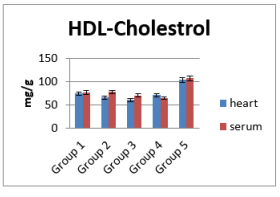

Fig 5- HDL-Cholesterol

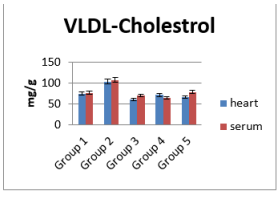

Fig 6-VLDL-Cholesterol

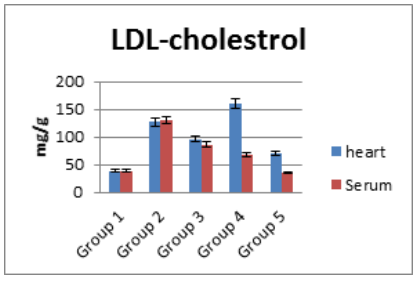

Fig 7- LDL-Cholesterol

Fig 1, Fig 2, Fig 3, Fig 4, Fig 5, Fig 6 Fig 7, the effect of the aqueous and ethanol extracts of *Alangium Salvifolium* leaf Wang on the total cholesterol, triglycerides, free fatty acid, Phospholipids, HDL-cholesterol, VLDL- cholesterol, LDL-cholesterol against isoproterenol-induced cardiac activity

HISTOPATHOLOGICAL INVESTIGATION

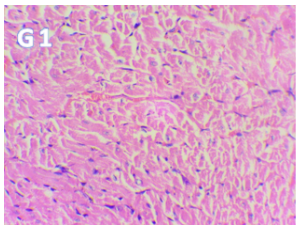

Fig 8

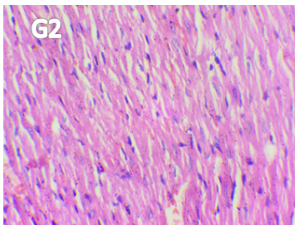

Fig 9

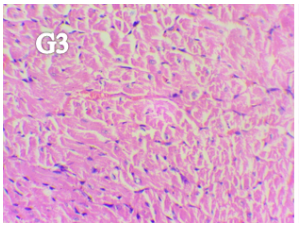

Fig 10

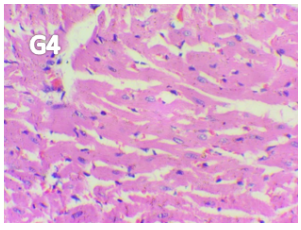

Fig 11

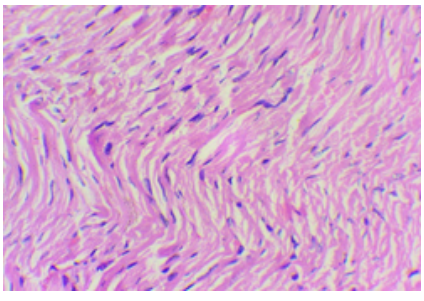

Fig 12

Fig 8-12: Histological examination of heart tissues of control and experimental animals.

G1) Normal rat; G2) ISO induced rat of cardiac muscle fiber; G3) Rat treated with *Alangium Salvifolium* aqueous extract and isoproterenol showing a normal heart with mild inflammation; G4) Rat treated with *Alangium Salvifolium* ethanol extract and isoproterenol showing a normal heart with mild inflammation; G5) Pretreated with Atrovastin showing regeneration of normal cardiac muscle.

In present identification of the aqueous and ethanol extract of *Alangium Salvifolium* leave extracts was put a value for subchronic toxicity study after oral administration. The plant is used for different medicinal value due to many bioactive phytoconstituents such as alkaloids, flavonoids. The reported therapeutic actions of the plant include anti-diabetic activity. [18]., anti-cancer activity [19].

An increase of 89 mg/dL in the triglyceride level is associated with a 30% increase in coronary heart disease in men and a 70% increase in women [20]. Generally, it has been identified that lipid profile is a complication in the cardiac activity in heart tissue and serum level during the study it discovers an increase in cholesterol, triglycerides, free fatty acid, phospholipids in isoproterenol injected cardiac rats as compared to normal rats. The aqueous and ethanol extract showed a significant reduction in total cholesterol, triglycerides, free fatty acid, phospholipids when compared to pair with the ISO control group.

The Study was carried out with heart tissue and serum was collected blood sample the lipoproteins such as LDL-cholesterol, VLDL, and HDL-cholesterol in isoproterenol injected cardiac rats as compared to normal rats. The aqueous and ethanol extract showed a significant decrease in the induced group of HDL, and an increase in VLDL, HDL in the when compared to paired with $p<0.05$ significant the ISO control group. The potential cardiac activity of principles, which produce the hypolipidemic effect in cardiac activity in Wister albino rats. The outcome of the lipid profile confirmed the potential of the cardiac activity of *Alangium Salvifolium* leaf extracts.

The increased levels of the cardio-protective lipoprotein; HDL-c after administration of *Alamgium Salvifolium* plant extracts concluded that the plant has a potent cardio-protective effect, and this effect may be

due to the increased activity of lecithin: cholesterol acyltransferase (LCAT), an enzyme which plays a key role in incorporating the free cholesterol into HDL-c which is then catabolized by the hepatocytes [21]. The increase in the level of TC, TG, and LDL-C and a decreased level of HDL-C contribute to increasing the risk for the development of cardiovascular diseases. [22].

Hypertriglyceridemic patients are also at a risk for the cardiovascular disease often develops a lipoprotein profile characterized by elevated triglyceride, LDL, and low HDL cholesterol, which causes myocardial membrane damage [23]. Increased levels of triglycerides are associated with cardiovascular disturbances as ISO promotes lipolysis in the myocardium [24]. ISO-induced MI is associated with increased levels of circulatory lipids, which cause hypercholesterolemia and atherogenesis due to an unregulated accumulation of lipids in tissues. An Increase in cholesterol levels leads to increased membrane fluidity and permeability, which in turn alters the cytoplasmic viscosity and its chemical composition [25].

Reported that a diet supplemented with 5% and 10% *Alangium Salvifolium* extracts improved the altered lipid profile in isoproterenol-injected rats. Moreover, treatment with alkaloids and flavonoid and saprogenic of *Alangium Salvifolium* extracts of TC, TAG, LDL-c and AI values in hyperlipidemia rats [26].

Fig (8-12) Histopathological parameter is the Isoproterenol admini stration that resulted in severe necrotic changes along with focal loss. Plant extracts treated marked fragmentation of muscle fibers in rat hearts as compared to control and experimental animals with no damage to the muscle. Atorvastatin-treated rats exhibited a decreased degree of necrosis with less fragmentation of fibers after administration of isoproterenol, which shows the cardio-protective effect of atorvastatin against isoproterenol-induced cardiac necrosis.

4.0 CONCLUSION

The presence of lipid profile and histopathological exploration study that *Alangium salvifolium.L* Aqueous and ethanol extract has prospective treatment of the would-be to protect against myocardial infarction by protective the levels of TC, TGL PL, FFA, and LDL and aggregate the levels of HDL and was confirmed by histological changes. The potent cardioprotective activity of the plant was due to the presence of phytochemicals and antioxidant properties. In conclusion, further studies are needed to identify the active principles responsible for the cardio-protective activity and to evaluate its exact mechanism of action.

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