INTRODUCTION

Myocardial infarction is one of the major causes of mortality in industrially developed as well as in developing nations. Increasingly, it is claiming victims from the younger, more active middle and lower strata of the society in developing countries. Myocardial infarction or cardiovascular disease is the leading cause of death for both men and woman in all over the world. Heart attack occurs when heart muscle’s oxygen deprivation is severe enough to kill myocardial cells. The technical name of heart attack accurately reflects the event of myocardial (heart muscle) infarction (cell death) due to ischemia. Two types of myocardial infarction having different morphology and clinical significance are commonly observed. The more common and serious type is the transmural infarct, in which the ischemic necrosis involves the full or nearly full thickness of the ventricular wall. It is associated with severe coronary atherosclerosis. Sub endocardial (non transmural) infarcts constitute areas of ischemic necrosis limited to the inner one third or at most one half of the left ventricular wall. Acute myocardial infarction is the most important form of ischemic heart disease. Myocardium, the middle layer of heart is supplied with blood by coronary arteries. When blood supply is insufficient to this myocardium, death of myocardial muscle occurs, a condition known as ‘ischemia of the myocardium’. Ischemia of myocardium leading to its necrosis is referred as myocardial infarction. Myocardial ischemia occurs when an imbalance develops between myocardial oxygen supply and demand. In the presence of a fixed coronary artery stenosis, increase in heart rate, blood pressure and left ventricular wall stress can lead to an imbalance in the supply or demand ratio, resulting in ischemia. Medicinal plant and some organic product used to important productivity effect of the treatment of heart attack. The stem of Salacia chinensis have been used as an antidiabetic drug, astrigent, abortifacient and root decoction used to treat amenorrhoea, dysmenorrhoea, and venereal diseases. The stems of Salacia chinensis have been extensively used for carminative, emmenagogue, blood tonic, cardio tonic, anti-inflammatory, antidiabetic purposes and the treatment of rheumatism, leukorrhea and stimulated lochial excretion. The stem and leaves are commercially used as a gutta-a linear isomer of natural rubber.

The intravenous injection of S. chinensis extract (4-120 mg/kg) caused a decrease in mean arterial blood pressure and heart rate of anesthetized rats in a dose-dependent manner. These effects were not blocked by atropine, a muscarinic receptor antagonist or propranolol, ß-adrenergic receptor antagonist.

The S. chinensis extract (0.01-0.3 mg/ml) caused vasodilatation of the thoracic aortic rings pre-constricted with phenylephrine in a dose-dependent manner. Ischemic heart disease is the generic designation for a group of closely related syndromes resulting from an imbalance between the supply and demand of the heart for oxygenated blood.

The Salacia chinensis is an important medicinal plant belonging to the family of Hippocrateaceae and small erect or straggling tree. S.chinensis is used to treat various diseases, therefore in this present study to investing the tissues defence system, cardio tonic properties and also isolate the...
S. chinensis

MATERIALS AND METHODS

Chemicals
Isoproterenol-HCL was obtained from sigma chemical company, St.Louis, MO, USA.

Administration of salacia chinensis
The S. chinensis stem extract was orally administrated at a concentration of 75,150,300,600 and 1200 mg/Kg b.w/rat/day for a period of 11 days. The toxic effect of isoproterenol. The optimum dosage for treatment, the rats were induced the myocardial by using isoproterenol. The optimum dosage for S. chinensis stem extract was fixed as 300mg/kg b.w/day for 11 days.

Induction of Myocardial infarction
Myocardial infarction was induced by intraperitoneal (ip) injection of isoproterenol hydrochloroied 150mg/kg body weight dissolved in physiological saline for at an interval of 24hrs/ for two days.

Experimental animal
Male Wistar albino rats (140-160g) were procured from Tamil Nadu Veterinary and Animal Sciences University, Chennai and were housed in polycarbonate cages in an animal room with a 12h day-night cycle with at temperature of 22 ± 2 °C and humidity of 45-60 %. They were fed with a commercial pelleted rats chow and water ad libitum during the experiment. The suitable optimum dosage of the drug was assessed by administering different dosages of S. chinensis stem extract (200, 300 and 400 mg/kg b.w/day) for different periods (7, 11 and 15 days).

Experimental method
The rats were divided in to four groups with six animals for each group. Group 1: Normal control rats (untreated). Group 2: Rats administered with isoproterenol (150mg/Kg body weight / day, at an interval of 24 hrs) for 2 days. Group 3: Rats administered with S. chinensis stem extract (300mg/Kg body weight / day, oral) for 11 days prior to administration of isoproterenol and along with isoproterenol administration for subsequent two days. Group 4: Rats are pre-treated with S. chinensis stem extract (300mg/kg b.w/day) in aqueous solution orally for 11 days. At the end of the experiment period (24 hours after the second dose of isoproterenol) the animals were sacrificed by cervical decapitation. The Blood was collected and the serum was separated by centrifugation. The heart was dissected out and immediately washed with ice-cold saline. A portion of heart tissue was homogenized (0.1 N Tris HCl buffer, pH 7.4) and used for the biochemical studies. Another portion of the heart tissue was stored in formal saline for histological studies.

Preparation of Hemolysate
The animals were sacrificed by cervical decapitation. The Blood was collected and the serum was separated by centrifugation. The heart was dissected out and immediately washed with ice-cold saline. A portion of heart tissue was homogenized (0.1 N Tris HCl buffer, pH 7.4) and used for the biochemical studies.

Biochemical estimation
The lipid peroxide was assessed by method. LDH-Lactate dehydrogenase was assayed according to the method. Alanine aminotransferase (ALT) Aspartate aminotransferase (AST) the enzyme activity was assayed by the method. Protein was estimated. Super oxide dismututase (SOD). Glutathione peroxidise (Gpx). Glutathio- s transferase was assayed by the method.

Statistical analysis
All data were expressed as mean ± standard deviation for four animals in every group. Mean values were obtained by one-way analysis of variance (ANOVA), followed by post hoc Sheffe’s test using 7.5 version of SPSS computer soft ware. The significance of difference between and within various groups was determined. The values were considered significant when p<0.05.

RESULTS AND DISCUSSION

Cardiac marker enzymes

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administered rats. The methonolic stem extract of *S. chinensis* pretreated rats were tolerated against isoproterenol-administration and activities near normal.

![Figure 2: Alanin transaminase and aspartate transaminase](image)

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![Figure 3: Level of nonenzymatic antioxidant](image)

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![Figure 4: Activities of SOD and CAT in the experimental rat](image)

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The biochemical alterations leading to actual myocyte necrosis involve cellular processes. At the cellular level, several structural alterations in cardiocytes and interstitial occur in the failing heart which, acting individually or in concert, can adversely influence global left ventricular contractile performance. Such alterations include: hypertrophy of residual myocytes. Abnormalities of mitochondria abnormalities in myocyte contractile structure and progressive accumulation of collagen in the interstitial space. The biochemical and physiological changes associated with naturally occurring infarction has very close resemblance with that produced by inducing with isoproterenol hydrochloride obtained from sigma chemicals. The macromolecules were to leak from the damaged tissues, enzymes; because of their damage. The mechanism of isoproterenol damages the membrane is still not clearly understood. The release of cellular enzymes reflect a non-specific in the plasma membrane integrity / or permeability as a response to β-adrenergic stimulation.

![Figure 5: Activities of lipid peroxidase and glutathione reductase](image)

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**Lipid peroxidation, free radicals and membrane damage**

Cell membranes rich in polyunsaturated fatty acid as a part of the structure are susceptible to peroxidative injury. Lipid peroxidation reactions with subsequent disruption of both liposomal and cellular membranes may be induced by enzymatically generated free radicals. When membranes undergo peroxidative damage the products of lipid peroxidation may be released in to the extra cellular space, which influence the vascular permeability and leukocyte chemotaxis. Membrane fluidity is due to the presence of polyunsaturated fatty acid chain in many membrane lipids. Free radicals.
generated during lipid peroxidation process will reduce membrane fluidity, increase membrane permeability and impair the functions of membrane bound enzymes, receptors and other proteins.\textsuperscript{24}

### Figure 6: Activities of glutathione S-transferase in heart tissue of control and experimental rat

To investigate the biochemical events in the protective action of methenolic stem extract of \textit{Salacia chinensis} during experimental myocardial infarction in albino rats. Histopathological studies were carried out in myocardium to reveal the protective role of plant extract on isoproterenol-induced myocardial infarction. Myocardial ischemia is associated with the information of oxygen free radicals.\textsuperscript{25} The activities of antioxidant enzymes in serum and heart were assayed to show the antioxidant and free radicals scavenging potential of \textit{Salacia chinensis}.

\textit{S.chinensis} is used to treat various diseases. So far there were no reports available on tissue defence system in experimentally induced myocardial infarction in rats for \textit{S.chinensis}. Therefore in this present study to investing the tissue defence system, cardio tonic properties and also isolate the marker compound present in the methenolic stem extract of \textit{S. Chinensis}. Experimental models of myocardial infarction have been developed in laboratory animals to understand the morphology, biochemistry, electro physiology and mechanical properties of the damaged myocardium and to test the efficacy of various therapeutic agents. Myocardial infarction due to occlusion of coronary artery by ligation has been developed by.\textsuperscript{26} Ligation of either of the two major branches of the left coronary artery has been one of the most popular techniques in smaller animals like dog, donkeys and pigs etc. however the mortality rate are fairly high in this method. Subcutaneous administration of isoproterenol - HCl, adrenergic receptor induces myocardial necrosis in smaller animals like rats and is found to be more convenient because of the relatively small size of the coronary arteries.\textsuperscript{27}

Ischemia induces profound metabolic changes in the myocardium; postulated sequence of alterations involved in the pathogenesis of irreversible myocardial injury in oxygen deficiency induces metabolic changes including decreased ATP, decreased pH and lactate accumulation in ischemic myocytes.\textsuperscript{28} The altered metabolic leads to impaired membrane transport, with resultant derangements in intra cellular electrolytes. An increase in cytosolic Ca\textsuperscript{2+} might trigger the activation of proteases and phospholipases, with resultant cytoskeletal damage and impaired membrane phospholipid balance, lipid alteration which include increased phospholipid degradation, with release of free fatty acids and lysophospholipids and decreased phospholipid synthesis. Lipid peroxidation occurs as a result of attack by free radicals that are produced at least in part by the generation of excess electrons in oxygen-deprived mitochondria.\textsuperscript{29} Free radicals might also be derived from metabolism of arachidonic acid, metabolic of adenine nucleotrophil. The irreversible phase of injury appears to be mediated by severe membrane damage produced by phospholipid loss, lipid peroxidation and cytoskeletal damage.\textsuperscript{30}

SOD and CAT activities were decreased on isoproterenol administration, which is in accordance with the observation of CAT and SOD play vital role in body defense mechanisms against the harmful effect of oxygen free radicals.\textsuperscript{31,32} During myocardial infarction, superoxide radicals are generated at the site of damage modulates SOD and CAT resulting in the loss of activity and accumulation super oxide anion, which damages myocardium. Pretreatment with \textit{S.chinensis} extract increased the activity of SOD and CAT, which scavenge, super oxide radicals and reduced the myocardial damage caused by free radicals upon isoproterenol administration. The level of serum antioxidants α-tocopheral and ascorbic acid decreased significantly in isoproterenol administered rats decreases in serum antioxidants levels in rats could be due to an increase in free radical production by isoproterenol, α-tocopheral is a lipid soluble chain breaking antioxidant capable of scavenging centred free radicals. Histological findings confirm the induction of myocardial infarction by isoproterenol. The following observations were made in the heart tissue of control and experimental groups of rats. The control rat heart showed normal architecture. In the isoproterenol induced myocardial infarction rat heart showed severe cardiac damage with large areas of endocardial fibre generation with Foci of necrosis and inflammatory infiltrate in the myocardial.

The rats given \textit{S.chinensis} extract alone did not showed any abnormal changes in the architecture of the heart. The \textit{S.chinensis} stem extract pretreated and administered isoproterenol rats exhibited normal endocardial and myocardial fibre with occasional focus of few inflammatory cells only.

Analysis of haematological parameters could be used to finding the Effect of presence of the foreign compound like phyto- extracts on the blood of experimental animals. They are also used to confirm the suitable alteration in the metabolic level pathway.
CONCLUSION

In this study, myocardial infarction is induced in rat model following the administration of isoproterenol and it has been extensively used as a model for producing a infarction where it resembles the ischemic necrosis induced by coronary occlusion. Cardiac marker enzymes were assayed in serum and heart. The methonolic stem extract of *S.chinensis* was shown to possess antioxidative and cardio tonic properties. The results show that stem extract of *S.chinensis* was safe and highly effective in preventing cardiovascular dysfunction in rats, possibly due to both antioxidative and cardio tonic properties.

REFERENCES


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