SUMMARY OF IMPORTANT FINDINGS

1. Proteoglycans of normal heart tissue in rats:

   Acetone dry powder of the heart tissue was sequentially extracted using water, 0.15M sodium acetate and 2M CaCl₂ solution. The residue was digested with collagenase and elastase. Maximum amount of proteoglycan was extractable by water. CaCl₂ and sodium acetate also solubilised significant amount of proteoglycans. But collagenose and elastase digestion solubilised only smaller amounts.

   Heparin sulphate-proteoglycans (HS-pg) was the major proteoglycan in the water, sodium acetate and CaCl₂ extracts. Chondroitin-4-sulphate-proteoglycan (Ch-4S pg) was present only in the sodium acetate and CaCl₂ extract while dermatan sulphate proteoglycan (DS-pg) was present in appreciable amount in the CaCl₂ extract.

   Chondroitin-6-sulphate proteoglycan (Ch-6S-pg) appears to be the major Pg bound to collagen, while HS-pg was found bound to elastin. The fact that hyaluronic acid (HA) is associated with all these fractions indicates an aggregation of these proteoglycans with HA.
2. Changes in the proteoglycans (pg) of heart tissue in isoproterenol induced myocardial infarction

Myocardial infarction produced both qualitative and quantitative changes in pg fraction of the heart tissue. The infarcted tissue gave 6 pg fractions in the water extract as compared to 3 fractions in the normal tissue. Ch-4S-pg and HS-pg were the major proteoglycans in the water, sodium acetate and CaCl₂ extracts in the case of the infarcted tissue. In addition, water and CaCl₂ extracts contained DS-pg. In the case of normal heart, the major proteoglycans in the water sodium acetate and CaCl₂ extract was HS-pg.

HS-pg was associated both with collagen and elastin in the infarcted tissue. In addition DS-pg and Ch-6S-pg were also released on elastase digestion. In the case of normal heart tissue, HS-pg was the major pg in both the collagenase and elastase digest.

3. Ethanol consumption and lipid metabolism in normal control rats:

Histopathological studies show that ethanol intake produced focal necrosis of the myocardial tissue. There was increase in the activity of alcohol dehydrogenase and aldehyde dehydrogenase indicating that the heart has the
ability to metabolise alcohol. There is increased concentration of cholesterol and triglycerides in the heart and serum in rats given ethanol. On the other hand aortic cholesterol was found not to be affected in rats given ethanol. Liver showed higher level of cholesterol and triglycerides in the rats given ethanol.

4. Ethanol consumption and lipid metabolism in rats given isoproterenol

Histopathological studies show that the extent of necrosis in ethanol fed rats given isoproterenol was more or less similar to those seen in rats administered ethanol alone. Cholesterol and triglycerides in the serum, heart and aorta showed much higher concentration in rats administered ethanol and given isoproterenol when compared to isoproterenol treated rats. Myocardial alcohol dehydrogenase and aldehyde hydrogenase showed increased activity in ethanol treated rats given isoproterenol. The percentage mortality was lower in rats administered ethanol and given isoproterenol when compared to rats treated with isoproterenol alone.

The results on the survival rate and histopathological studies indicate that ethanol provides some protection against myocardial infarction induced by isoproterenol.
5. **Effect of ethanol administration on the metabolism of glycosaminoglycans in normal control rats.**

Rats treated with ethanol showed higher concentration of some of the gg fraction (HA, Ch-4S) in the heart when compared to control rats, while other gg fractions were not significantly altered. The effect of ethanol administration on the concentration of gg in the aorta varied with the dose of ethanol. Ethanol at higher level generally produced a decrease in the concentration of most of the gg in the aorta while at lower level, there was generally either decrease or no significant alteration.

The activity of hyaluronidase and \(\beta\)-glucuronidase, two important enzymes involved in the degradation of gg was lower in rats administered ethanol.

The concentration of PAPS in the heart was higher at the lower level of ethanol intake and lower at the higher level, when compared to control rats. Activity of sulphate activating system which generated PAPS was more in rats fed ethanol at lower level, while it was lower at the higher level. Sulpho transferase activity also showed a similar change.
6. **Effect of ethanol administration on the metabolism of glycosaminoglycans in the heart in isoproterenol induced myocardial infarction in rats**

Isoproterenol treatment caused significant increase in all the gg fraction in the heart. Rats administered ethanol and given isoproterenol did not show significant alteration in the concentration of gg in the heart, except in few cases when compared to isoproterenol treated controls. During stages of recovery, pretreatment with ethanol restored many gg fractions to levels nearer the values in the normal rats. In the case of aorta, isoproterenol treatment generally produced either a decrease or no change in the gg. Treatment with ethanol and isoproterenol produced lower levels of aortic gg than those observed in isoproterenol treated controls. During recovery ethanol treatment in many cases produced levels of gg nearer to those in the normal rats.

7. **Effect of ethanol administration on the metabolism of glycoproteins in normal heart**

Ethanol administration did not generally affect the carbohydrate components of glycoproteins of the heart and serum except in the case of fucose. The activity of serum glycohydrolases also was not significantly affected except in the case of β-galactosidase at lower level of ethanol intake.
8. **Effect of ethanol administration on the metabolism of glycoproteins in the heart in isoproterenol induced myocardial infarction in rats**

Ethanol treatment generally produced smaller changes in the carbohydrate moieties at period of peak infarction when compared to isoproterenol treated control rats. But during recovery ethanol treatment increased the deposition of gp in the heart.

The activity of some glycohydrolases (β-N-acetyl glucosaminidase, β-fucosidase) was higher at peak period of infarction in rats treated with ethanol and given isoproterenol while the activity of the some other enzymes showed decrease. During recovery phase these enzyme activities in most cases showed increase.

9. **Effect of coconut oil and saffola oil on the changes in metabolism of lipids in isoproterenol induced myocardial infarction in rats**

Histopathological studies showed only minimal necrosis in the rats of the saffola oil group given isoproterenol, while in the coconut oil group there were areas of focal necrosis.

Concentration of cholesterol and triglycerides in the serum and heart was lower in the saffola oil group when
compared to those in the coconut oil group. These results showed that saffola oil may offer some protection against myocardial infarction induced by isoproterenol.

10. Effect of coconut oil and saffola oil on the metabolism of glycosaminoglycans in isoproterenol induced myocardial infarction in rats

Saffola oil brought about a decrease in the concentration of sulphated gg in the heart except HS on induction of myocardial infarction by isoproterenol, when compared to coconut oil. At period of peak infarction, the saffola oil group showed lower concentration of many gg fractions in the aorta as compared to the coconut oil group. This may result in decreased deposition of lipids in the aorta in the saffola oil since it is known that accumulation of lipids in the aorta is the result of interaction between aortic gg and serum lipoproteins forming insoluble complexes.

Saffola oil group showed lower $\beta$-N-acetyl glucosaminidase activity in the heart, at peak period when compared to coconut oil group.

12. Effect of coconut oil and saffola oil on the metabolism of glycoproteins in isoproterenol induced myocardial infarction in rats

The concentration of the carbohydrate components of gg in the heart was lower in the saffola oil when compared to the coconut oil group. The activity of glycohydrolases was lower in the rats of the saffola oil group given isoproterenol, when compared to the coconut oil group.
LEGENDS

Sections of heart from the apical region stained with hematoxylin and eosin X16

PLATE A

(1) Normal
(2) Normal + Isoproterenol
(3) 6% Alcohol
(4) 6% Alcohol + Isoproterenol
(5) 18% Alcohol
(6) 18% Alcohol + Isoproterenol

PLATE B

(1) Normal
(2) Normal + Isoproterenol
(3) 8% Coconut oil
(4) 8% Coconut oil + Isoproterenol
(5) 8% Saffola oil
(6) 8% Saffola oil + Isoproterenol