SUMMARY AND CONCLUSIONS

Recent studies indicate that the factors other than fats may be involved in atherosclerosis. One of these is carbohydrate in its various forms about which less is known.

So the study was undertaken to investigate the role of cellulose and pectin in a high sucrose diet supplemented with hydrogenated fat (Dalda), animal fat ghee and unsaturated vegetable fat Kardi oil. The effects of thyroactive compounds administered by injection was also investigated.

The work was carried out on albino rats. These rats were divided into 4 batches. According to variation in the diets each batch contained sub-groups. The record of an individual weight of the rat was made at the start. Then the animals were fed on the purified high carbohydrate (sucrose) diet with different types of the fats and thyroactive substances in combination with pectin and cellulose in different groups for eight weeks. After eight weeks blood was taken out by cardiac puncture under mild anaesthesia and after the rats were sacrificed and the whole liver was removed, weighed individually and analysed. The percentage increase or decrease of serum and liver lipids were estimated.

When the rats were maintained on high sucrose diet supplemented separately with three different types of fats (1) Hydrogenated fat - Dalda - (2) Animal fat - Ghee and (3) Unsaturated vegetable oil - Kardi oil, it was found
that there was a significant elevation in serum and liver
cholesterol over the rats kept on laboratory diet. Maximum
increase in cholesterol level was produced with Ghee in the
high sucrose diet while minimum cholesterol level was with
Kardi oil. Hydrogenated fats occupies intermediate position.
The lipid phosphorus also showed a significant rise in the
level. The changes in the cholesterol to lipid phosphorus
ratio and triglyceride level showed a definite pattern in
the serum. The ratio of the cholesterol to lipid phosphorus
content of the liver for rats fed with the laboratory diet
was significantly lower than the ratio for the rats fed
with the other diet.

When 1% cholesterol was added to the diet separately
with Ghee, hydrogenated fat - Dalada - and Kardi oil, Ghee
with cholesterol promoted the greatest weight increase
followed by Dalada and Kardi oil. Pectin or cellulose in
presence of cholesterol and either of the above fats did not
show much difference in the increase in weight. As
cholesterol was added externally in the diet, a significant
elevation in the cholesterol took place. This effect was
inhibited by feeding 6% pectin in the diet to the rats while
cellulose produced a significant rise in the level. In male
rats kept on Ghee and pectin or cellulose, and for female
rats receiving ghee and cellulose, the change in the
cholesterol concentration was not significant. Serum
lipid phosphorus level showed also a rise when the rats were fed cholesterol with either pectin or cellulose in presence of any one of the fats - Ghee, Balda and Kardi oil. The cholesterol to lipid phosphorus ratio in the serum of rats has been decreased significantly, when the rats were maintained on pectin. However, cellulose had no such effect with any of the fats used. 1% cholesterol in the diet with hydrogenated fat produced the maximum rise, while Kardi oil produced the minimum. Similarly, each fat combined with cellulose in the high sucrose diet showed an elevation in the triglyceride level while pectin showed a decrease in the level. The changes in the lipids in the liver caused by the variations in the diet was the same as those observed for serum.

As we have seen that hydrogenated fat Balda - in presence of 1% cholesterol in the diet produced hypercholesterolaemia and vegetable fat Kardi oil produced hypocholesterolaemia comparatively so these two fats were tried for further experiments to investigate the effects of thyroactive compounds. Pectin reduced hypercholesterolaemia while cellulose enhanced that effect.

Now it was the purpose to record the effects of thyroid active substance thyroxine and antithyroid substance thiouracil. In the rats fed high sucrose diet, 1% cholesterol, 4% of either pectin or cellulose and 8%
of any one of the fats - Baida or Kardi oil. In this experiment 6 dietary combinations were studied.

(1) Control diet. (2) Control diet + Thryoxine (or thiouracil). (3) Control diet + Cholesterol + Thyroxine (or thiouracil). (4) Control diet + 1% cholesterol + 4% pectin + Thyroxine or Thioracil. (5) Control diet + 1% cholesterol + 4% cellulose + Thyroxine (or Thioracil).

Thyroxine caused more loss in the weight of rats fed with Kardi oil than with hydrogenated fat Baida, while thiouracil caused an increase in the percentage increase in weights and this rise was more with hydrogenated fat and less with Kardi oil. The administration of cellulose caused an increase in the percentage increase in weight while with pectin the percentage increase in weight was less.

The experiment indicated that thyroxine lowered the cholesterol concentration while antithyroid substance thiouracil raised it. Incorporation of 1% cholesterol produced hypercholesteremic condition in the rats. Then thyroxine was fed to the rats with pectin, the rate of degradation of cholesterol increased while with cellulose the cholesterol concentration have been increased. Thyroxine caused a slight increase in serum lipid phosphorus levels which was enhanced by the addition of cholesterol whereas pectin and cellulose did not affect the lipid phosphorus.
Thyroxine caused a significant lowering of cholesterol to lipids phosphorus ratio with both of the fats. This ratio was increased when the diet was supplemented with Balda, thyroxine and cholesterol; thyroxine with pectin and cellulose caused no significant changes in the ratio. Similar results were obtained when the rats were maintained on Kardi oil, 1% cholesterol, thyroxine with or without pectin or cellulose. A slight increase in the triglyceride level was observed with both of the fats. The pattern of changes in the liver lipids caused by thyroxine is the same as shown by serum. Thyroxine with hydrogenated fat caused a significant increase in the level of lipid phosphorus and decrease in the cholesterol to lipid phosphorus ratio, while with Kardi oil there was no significant difference in lipid phosphorus concentration but cholesterol to lipid phosphorus ratio has been decreased. Cholesterol with hydrogenated fat caused a slight increase in lipid phosphorus and cholesterol to lipid phosphorus ratio. Pectin lowered lipid phosphorus with no change in the ratio while cellulose lowered lipid phosphorus with increase of the ratio.

Pectin with cholesterol and Kardi oil and thyroxine lowered lipid phosphorus with slight increase of cholesterol to lipid phosphorus ratio, while cellulose raised lipid phosphorus causing a fall in the ratio. There was a decrease in the triglyceride concentration with thyroxine which was increased by supplementing the diet with cholesterol and
cellulose and was decreased with pectin.

The antithyroid substance thiouracil enhanced hypercholesteremia. In the serum there was an increase in cholesterol concentration with decreasing cholesterol to lipid phosphorus ratio. A slight but significant increase in the lipid phosphorus was observed. Triglycerides also were increased. In cholesterol administration with pectin or cellulose did affect the lipid phosphorus level but cholesterol to lipid phosphorus ratio was slightly but no significantly decreased with pectin and increased with cellulose.

There was a significant reduction in the liver cholesterol with the administration of thiouracil with both fats. There was an increase in lipid phosphorus level with decreasing cholesterol to lipid phosphorus ratio. Triglycerides also were less with diets containing 1% cholesterol with thiouracil; cholesterol and cholesterol to lipid phosphorus ratio was increased consistently. Pectin with hydrogenated fat reduced cholesterol concentration without changing lipid phosphorus. With Kardi oil the effects are similar. Cellulose when fed to the rats with either hydrogenated fat or Kardi oil showed an increase in cholesterol and triglyceride concentration; a decrease in the lipid phosphorus with increasing cholesterol to lipid phosphorus ratio was observed.