LONG TERM EFFECTS OF DIETARY FAT/OILS ON SERUM AND TISSUE CHOLESTEROL LEVEL IN ALBINO RATS

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The study was carried on 60 albino rats of 8 weeks' age. These rats were divided into five (n= 12) each groups. Low Fat (LF) (5%) diet group and High Fat (HF) (20%) diet groups i.e. Olive Oil (00), Corn Oil (CO) & Butter Fat (BF) group respectively. I IF diet was given for 12 weeks and then the diets were admixed with cholesterol and Propylthiouracil fat for the next 20 weeks. LF diet group were divided into two groups after 12 weeks. Once received LF diet and the other received HF diet with cholesterol and PTH. In our study the serum cholesterol level increased in HF (20%) diet group. The LF (5%) diet, CO (20%), OO (20%) decreased the serum cholesterol level before the supplementation of atherogenic elements but it slightly increased the serum cholesterol level after atherogenic supplementation. On the other end BF diet increased the serum cholesterol level before and after atherogenic supplementation. However, the tissue cholesterol level increased 3 fold in all type of tissues in BF diet group as compared to other diet groups. Least rise in tissue cholesterol level were seen in CO diet group.

INTRODUCTION

Lipids serve as an important ingredient of the food, providing maximum number of calories per mole. These serve many useful functions in the body but the excess is hazardous. These are labelled as risk factors for many diseases such as atherosclerosis, coronary heart disease and cholelithiasis.[1] Ingestion of dietary fats/oils affects the concentration of serum and tissue cholesterol [2 &3].

Several Investigations demonstrated that the lipid lowering effect of dietary oils is related to the degree of unsaturation of their constituent fatty acid.[4 & 5] Low fat diet decreases the serum and tissue cholesterol level.[6] Serum and tissue cholesterol has been reported by feeding cholesterol to the rats[7] It was therefore, planned to see the effect of various dietary lipids on serum and tissue cholesterol level in albino rats.

MATERIALS AND METHODS

Sixty albino rats of eight-week age 150-200 Grams weight with equal number of male and female were taken. They were divided into low fat diet (LF) group (n=24) rats and high fats diet (HF) groups i.e. olive oil (OO), corn oil (CO) and butter fat (BF) oil (n-12) in each group. They were fed respective diets for 12 weeks (Table-1).

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Table-1. Composition of Diets Fed for 12 Weeks

INGREDIENTS	CONTROL GROUP DIET	OLIVE OIL DIET	CORN OIL DIET	BUTTER FAT DIET
Maize	60	45	45	45
Casein	20	20	20	20
Cane sugar	10	10	10	10
Olive oil	4	20	-	-
Corn oil	1	-	20	20
Butter fat	1	-	-	-
Minerals	3	3	3	3
Vitamins	2	2	2	2

(Bieri et al 1977).

Low fat diet group animals, were divided into two groups. Low fat (5%) and Mixed high fat (20%) diet. Low fat diet group continued low fat diet for next 20 weeks. While other group received mixed fat diet containing cholesterol and Propylthiouracil for another 20 weeks.

Table:2-The Composition of Diets Fed for Next 20 Weeks

INGREDIENTS	LOW FAT DIET 5%	MIXED HIGH FAT 20%	OLIVE OIL DIET 20%	CORN OIL DIET GROUP 20%	BUTTER FAT DIET GROUP 20%
Maize	60	45	45	45	45
Casein	20	20	20	20	20
Cane sugar	10	10	10	10	10
Olive oil	1	7	20	-	-
Corn oil	1	7	-	20	-
Butter fat	1	7	-	-	20
Minerals	3.5	3.5	3.5	3.5	3.5
Vitamins	1	1	1	1	1
Cholesterol	-	1.0	1.0	1.0	1.0
Bile salt	0.3	0.3	0.3	0.3	0.3
Propylthiouracil	0.1	0.1	0.1	0.1	0.1

(Bieri et al 1977).[8]

The diets were prepared at 2 weeks interval and stored at 2-8°C in closed containers/ Weighed amount of diet

was placed in individual metabolic cages each day and left out was weighed. Each rat consumed almost equal amount of diet, blood samples were drawn on 0,6,12 and 32 weeks by heart puncture and serum cholesterol was determined by GOD - PAP method.[111] At the end liver, momentum and adrenals were removed, separated from fat and connective tissue, washed with ice cold saline, blotted, dry, weighed and homogenized with chloroform and methanol (2:1) ratio."[1] The extracted mixture was used for cholesterol determination.

RESULTS

The study was carried out on 60 albino rats, 08 weeks old. The animals were divided into five groups with 12 rats in each group. These different groups were used to observe the effects of dietary fats/oils. After 12 weeks, these groups were fed dietary fats/oils admixed with atherogenic elements in diet for another 20 weeks, to see the combined effect of hyperlipidemic and hypercholesterolemic state on serum and tissue cholesterol levels in albino rats.

Table-3 Comparison of Serum Total Cholesterol Levels Between Various Dietary Groups on 0,6,12 and 32 Weeks.

GROUPS	Serum Total Cholesterol md/dl			
	0 WEEK	6 WEEKS	12 WEEKS	32 WEEKS
Low fat diet group 5%	86.1+5.9	84.4+6.9	82.4+7.0	101.5+7.3**
Mixed High fat 20% diet group	70.3+2.6	74.2+1.8"°	82.4+6.1 *	119 6-7 8**
Olive oil diet 20% group	88.6+9.9	84.0^8.2	78.6+7.9	125.1+7 7**
Corn Oil 20% diet group	89.2+6.9	81.0+6.6	72.4+8.6	115.7+8.1**
Butter fat 20% diet group	87.8+6.7	03.0+7.5""	1 13.6+7 T'	202.3+6.3**

oo = Statistically significant difference between 6 Vs 0 weeks.

++ = Statistically significant difference between 12 Vs 6 weeks.

** = Statistically significant difference between 32 Vs 12 weeks.

Table-4: Comparison of Tissue Cholesterol in Various Dietary Fat/Oils Groups at 32 Weeks

TISSUE	Tissue Cholesterol mg/gm		
OIL/FAT GROUPS	LIVER	OMENTUM	ADRENALS
Low fat 5% diet group	2.79+0.60	2.27+0 7	20 7
Mixed high fat 20% diet group	15.23+2.71	3.75+2.57	16.2
Olive oil 20% diet group	9.45+3.18	15.72+3.31	18.0
Corn oil 20% diet group	10.20+3.56	9.13+3.1	12.0
Butter fat 20% diet group	54.0+8.2	56 11 + 18.3	24.0

DISCUSSION

There is strong correlation between elevated plasma cholesterol levels and coronary heart diseases." Regular ingestion of large amount of saturated fat and cholesterol contribute to an elevation of plasma cholesterol. Unsaturated fats when consumed in moderate amount have beneficial hypercholesterolemic action, while saturated fats are said to be hypercholesterolemic.[13,14]

High levels of plasma cholesterol is a risk factor for coronary heart disease."' Our results are comparable with Oh et ah,[16] who observed that serum cholesterol level increased almost double with high cholesterol supplementation with saturation fat. as compared to low fat diet group. In our study it is observed that olive oil and corn oil decreased serum cholesterol levels but saturated fats increased the serum levels of cholesterol before and after cholesterol supplementation.

Similarly, the tissue lipid profiles of rats on high fat and high cholesterol diet in hypothyroid animals were compared. There were significant changes in serum cholesterol. Tissue cholesterol levels increased significantly but to a variable extent in liver and omentum. However, the changes in the lipid levels in the adrenals were variable. Tissue cholesterol increased with saturated fats, while it generally decreased with unsaturated fat,[17] our study is comparable to the Thompson[1,] i.e. tissue cholesterol increased with saturated fat while it decreased with unsaturated fats, whether mono or poly unsaturated fats are fed.

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