A COMPARATIVE STUDY OF CHOLESTEROL CONTENTS IN EGGS OF DOMESTIC HENS AND POULTRY FARMS LAYERS

M.A.J. Kamran, and Qazi Rashid Ahmad
Department of Pharmacology and Therapeutics,
Ayub Medical College.

Abstract: One hundred eggs of two different breeds of hens, i.e., domestic hens and layers (Starcross) were analysed for their cholesterol contents, and their results were compared. It was observed that cholesterol content of layer's eggs was higher than domestic hen's eggs. The cholesterol contents were found similar, on the basis of unit weight of egg-yolk in both groups. It was concluded that the cholesterol of egg-yolk was dependent on the size and weight of the egg-yolk due to various other factors.

Introduction

All animal tissues contain cholesterol and hence all carnivores ingest this sterol. It is incorporated in all the lipoproteins in varying proportions. Many daily diets that contain eggs and meats, especially organ meats, regularly include as much as 1000 mg of cholesterol each day[1]. Eggs are included in daily diets as a rich source of essential nutrients. But an egg contains about 300 mg of cholesterol and when eaten in large numbers may raise the plasma cholesterol[2]. It has been demonstrated that by adding cholesterol to the diet of chicken, the blood cholesterol can be greatly increased with the production of atheroma[3].

It is the subject of common observation that the poultry feeds contain meat and fish meals, which may impart considerable amount of cholesterol to the layers. The hens in poultry farms are less active and confined to their cages. On the other hand, domestic hens commonly consume garbage and offal foodstuffs which are deficient in cholesterol. Moreover, the domestic hens get exercise as they freely more in open atmosphere.

In the light of aforesaid facts, the authors carried out the present work in order to find out whether there is any difference in the cholesterol contents of eggs obtained from the hens of poultry farms and those of the domestic ones.

Material and Methods

Two types of commonly available eggs were included in the study.

1. Group A, consisted of fifty eggs of domestic hens collected from five different villages. Ten eggs obtained from each village were kept in subgroups A, to A_5.
2. Group B, consisted of 50 eggs of layers (starcross) obtained from five different poultry farms. Ten eggs from each poultry farm were kept in separate sub-groups, B, to B_5.

Weights of whole eggs and egg-yolks were determined separately. Before cholesterol determination the egg-yolk was homogenised and each sample was analysed in duplicate. A 10% solution of egg-yolk was made in distilled water at 37°C and cholesterol was determined quantitatively by the method of Zak, modified by Bowman and Wolf (1962)[4]
The data were analysed by the recommended statistical methods and the results were tabulated.

Results

On comparison of analytical data, it was observed that there was no significant difference of parameters among the sub-groups of each individual group (Table-1). But significant differences were observed between groups A and B. In group A (Domestic hen's eggs) the weight of whole eggs ranged from 43.8 g to 58.8 g with a mean value of 49.49 ± 3.31. In group B (layer's eggs) the whole egg weight ranged from 49.00 g to 69.7 g with a mean value of 58.64 ± 5.77. The difference in the weights of whole eggs of both groups was found highly significant ($P<0.0001$). The weight of egg-yolk in group A varied from 12.6 g to 18.2 g with an average of 14.83 ± 1.20, and the weight of egg-yolk in group B was found between 12.8 g and 25 g having mean of 17.07 ± 2.25. The difference was significant ($P<0.01$). Cholesterol per egg yolk in group A varied from 217.5mg to 295mg with a mean of 258.39 ± 25.77. In group B, cholesterol per egg-yolk varied from 229.5mg to 465.5 mg. The mean figure was worked out to be 295 mg ± 42.29. The difference was statistically significant ($P<0.05$).

The quantity of cholesterol per unit gram of egg-yolk i.e., 16 g (which is the combined mean of egg-yolks of both groups) was compared between the both groups. In group A, cholesterol/16 g egg-yolk ranged from 209.65 mg to 364.13 mg with a mean value of 277.75 ± 23.48. In group B, cholesterol/16 g egg-yolk ranged from 240.42 mg to 342.06 mg with a mean value of 276.83 ± 19.25. The difference was not significant statistically (Table 2).

Discussion

It has been reported that absorption of cholesterol in a man on a high cholesterol diet is about 15mg/kg body weight per day. Such cholesterol as is absorbed, inhibits the endogenous production which in man accounts for about 14mg/kg body weight per day.[3] It means that a man on high cholesterol diet ingests an extra amount of cholesterol which may raise the blood cholesterol content of the body to about 60 mg per day. There is a considerable evidence that a high intake of saturated fats and of cholesterol increases the concentration of blood cholesterol and certain lipoprotein fractions. These elevated levels of blood lipids appear to be highly correlated with the incidence of cardiovascular diseases.[5] Therefore, it has been suggested that eliminating meat fats and using limited amounts of dairy fats and egg yolk, place the cholesterol intake within the recommended levels.[1] It has

Table 1 – Mean Values of Analytical Results in Sub-groups of Eggs.

Parameters		Sub-groups (Domestic Hens)					Sub-groups (Poultry Hens)			
	A_1	A_2	A_3	A_4	A_5	B_1	B_2	B_3	B_4	B_5
Weight of whole egg (g) Mean ± Standard Deviation	47.98 ±3.33	51.12 ±3.34	50.48 ±3.76	49.24 ± 2.55	48.61 ± 2.57	57.28 ±4.99	59.42 ± 5.78	58.53 ±6.60	57.13 ±4.42	55.34 ±3.37
Weight of egg-yolk (g) Mean ± Standard Deviation	14.84 ±0.90	14.79 ±1.47	14.90 ±1.58	14.62 ±1.17	15.11 ±0.98	17.09 ± 2.30	17.34 ±3.31	17.28 ±2.11	16.71 ±1.47	16.94 ± 2.09
Cholesterol in egg-yolk (mg) Mean ± Standard Deviation	253.85 ±21.97	249.02 ±17.66	259.27 ±23.12	251.37 ±17.69	262.71 ±16.47	297.1 1 ±35.61	313.62 ±66.32	294.30 ±42.42	287.55 ±29.97	283.96 ±27.99

Note: - Each sub-group consisted of 10 eggs.

Table 2 – Relationship of Cholesterol Levels with the Weight of Eggs, Egg-Yolks and Breed of Hens

Group of Eggs	Breed of hens	Weight of whole egg (g)		Weight of egg-yolk (g)		Cholesterol Content (mg/egg-yolk)		Cholesterol Content (mg/16g egg-yolk)*	
		Range	Mean ± S.D.	Range	Mean ± S.D.	Range	Mean ± S.D.	Range	Mean ± S.D.
A	Domestic hen	48.8 -58.8	49.49	12.6 -14.83	14.83	217.5-295	258.39	209.65 -364.13	277.75
n = 50			±3.31		±1.20		±25.77		±23.48
B	Layer, (Starcross)	49 -69.7	58.64	12.8 -25	17.07	229.5-465.5	295.29	240.42-342.06	276.93
n = 50			±5.77		±2.25		±42.29		±19.25
H.S. =	Highly Significant								
S	Significant								
N.S. =	Non-Significant	H.S. (P <0.0001)		S. (P <0.01)	S.	(P <0.05)		N.S.	

*The figures represent the combined average of the two groups of eggs.

also been suggested that dietary cholesterol should be restricted in adolescence and in those with errors in cholesterol metabolism/

Various levels of mean cholesterol per egg-yolk have been reported in the literature, ranging from 254 to 300 mg per egg-yolk (2, 5, 6). In our study, the mean cholesterol per egg-yolk in the domestic hens (group A) was found to be 258.39 mg, while in layers (group B) it was found to be 295.29 mg per egg-yolk. The difference was significant on the basis of per egg-yolk. But there was no difference in cholesterol content on the basis of per unit gram of egg-yolk in both groups. So, it was concluded that large sized eggs of starcross layers contain more cholesterol than the small sized eggs of domestic hens. The cholesterol concentration was dependent on the weight of egg-yolk and not on the quality. Nevertheless, the nature of feed and sedentary life style of layer hens might be responsible for increased yolk size of the poultry farm eggs.

In view of the present study, it is evident that egg-yolks of starcross has contain an extra quantity of cholesterol ranging to about 50 mg. This excess of cholesterol added to other dietary lipids can produce an overload which may tilt the critical balance in a fat rich diet.

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