ORIGINAL ARTICLE

Effect of Egg Consumption on Serum Lipid Profile in Young Adults

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ABSTRACT

Egg is an easily available, inexpensive and a major source of proteins, fats, vitamins and minerals, but its cholesterol content is high (about 200 mg per egg) and it is frequently blamed for atherosclerosis with consequent cardiovascular diseases. Eggs are very popular to young people and parents are always concerned with their daily consumption. The aim of the study was to evaluate the effect of consumption of eggs on serum lipid profile of healthy young adults. It was a prospective comparative study carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, during the period from January to December, 2014. Eighty (80) non-diabetic, normotensive healthy young adults of 18-30 years of age were enrolled as study population. Among them 40 randomly selected subjects consumed one egg/day (Intervention group) and 40 subjects did not consume egg for 4 weeks' study period (Control group). Baseline BMI, BP, fasting blood glucose and lipid profile were estimated. After 4 weeks, lipid profile was estimated in each group. Informed written consent was taken from each participant. Permission was taken from Ethical Committee of the Institute. Data were analyzed by SPSS. Chi-square test, unpaired and paired 't' test were done.

In the intervention group, serum total cholesterol (TC) and LDL cholesterol (LDL-C) significantly decreased at the end of 4th week, but serum HDL cholesterol (HDL-C) and serum triglyceride (TG) did not differ significantly from baseline. In control group, serum HDL-C significantly decreased at the end of 4th week but serum TC, LDL-C and TG did not differ significantly. It may be concluded that daily consumption of one egg does not unfavorably influence on lipid profile in young adults. Further studies with larger sample size with and without risk factors may be conducted on middle and old age subjects.

Key words: Egg, Lipid Profile, Young Adults

Introduction

Eggs are nutritious, relatively inexpensive, palatable and popular dietary components among all people irrespective of age. Average composition of one egg, weighing about 60g is as follows: Yolk 17.4g (29%), Albumin 36.9g (61.5%), and Shell 5.6g (9.5%). Yolk contains all fat soluble vitamins and most of the water soluble vitamins in addition to fats[1]. Among several nutrients, lipids have attracted attention of researchers and consumers due to link between high dietary fat and CHD. Fat is found in egg yolk. An average egg (60g) contains 5.5-6.0g of fat[2]. Yolk lipids are Triacylglycerol (TG), Phospholipids (PL) and free cholesterol. Fatty acid components of TG and PLs are: Saturated fatty acids (29%), Monounsaturated fatty acids (44%), Polyunsaturated fatty acids (11%)[3]. Egg contains proportionately less saturated fat which is a strong dietary determinant of elevated LDL-C and increased risk for CVD[4].

The nutrient density of eggs makes them a valuable contributor to the overall nutritional balance of the diet and an economical source of high quality protein, an important component in the diets of the elderly, low-income families, growing children

and people limiting calories for weight loss purposes[5]. Egg is a major source of dietary cholesterol with an average of 200 mg cholesterol in one egg[6,7]. American Heart Association (AHA) guidelines no longer advise for or against egg or egg yolk consumption, but over a quarter century of research has shown that saturated fat-as opposed to dietary cholesterol-is a major dietary contributor to heart risk[8]. To avoid elevating blood LDL-C and to reduce CHD risk, dietary guidelines to prevent cardiovascular diseases emphasize on reduction of dietary cholesterol intake to less than 300mg/day for healthy adults or less than 200mg/day for persons with elevated cholesterol or heart disease and limit consumption of eggs to no more than 3 to 4 whole eggs per week[9,10].

Positive association was observed between dietary cholesterol and serum cholesterol[11,12]. Some studies did not find any effect of dietary cholesterol on serum cholestero[l6,13]. Hu et al.[12] showed that there is no overall significant association between consumption of one egg per day and risk of CHD and stroke. However, egg consumption appears to be associated with increased risk of CHD among individuals with diabetes[12]. A study in 40 hyperlipidemic adults who had not been treated with lipid-lowering drugs revealed that 2 eggs consumption per day for 6 weeks was not detrimental to endothelial function and serum lipids[14]. This study was designed to evaluate the effects of consumption of eggs on serum lipid profile in our young population.

Materials and Methods

It was a prospective study carried out in the Department of Biochemistry, Sylhet MAG Osmani Medical College, Sylhet during the period from January to December, 2014. Inclusion criteria were healthy normolipidemic young adults of 18 to 30 years, irrespective of sex. Exclusion criteria were hypertension, diabetes mellitus, heart disease, liver or kidney disease, pregnancy, egg allergies, using hormonal contraceptives and lipid-lowering medications. Among them, forty (40) randomly selected subjects were given one egg/day (intervention group) and rest 40 subjects did not consume egg during the 4 weeks study period (control group).

Informed written consent was taken from each of the patients and ethical approval was obtained from the Institutional Ethical Committee of Sylhet M.A.G Osmani Medical College, Sylhet before the commencement of the study.

Body weight and height were measured with standard procedure and BMI was calculated as Weight in Kilogram / Height in meters^2. Blood Pressure was measured in supine position.

After an overnight fasting of 10-12 hours, 5 ml of venous blood were collected with the help of a disposable syringe in between 7.00 am and 8.00 am at the beginning and 4 week after study period. Serum was separated and different fractions of lipid were estimated along with glucose.

Data were analyzed with the help of SPSS. Unpaired & paired 't' test and Chi-square (X^2) test were done as necessary. A probability value (p) of less than 0.05 was considered statistically significant.

Results

The demographic and clinical parameters are presented in table-I. There was no significant difference of age, sex, BMI and BP parameters between the study groups.

Table 1: Demographic and clinical parameters of study subjects

Parameters	Control Group (n=40)	Intervention Group (n=40)	P -value
Age (Years)	23.20 ± 4.18	21.95 ± 3.32	0.143*
Sex			
Male	20 (50%)	21 (52.5%)	0.823**
Female	20 (50%)	19 (47.5%)	
BMI (Kg/m^2)	22.30 ± 1.51	22.00 ± 2.11	0.455*
BP			
Systolic (mmg)	115.8.8 ± 6.69	113.75 ± 8.38	0.214*
Diostolic (mmg)	77.12 ± 4.51	75.75 ± 5.01	0.201*

*Unpaired't' test. ** Chi-square (χ^2) test

Table-II, III, IV & V shows changes of TC, TG, LDL-C, HDL-C after consumption of one egg/day for 4 weeks. At baseline there was significantly increased level of total cholesterol (TC) and LDL-C in the intervention group compared to Controls, and after 4 weeks both were significantly reduced from baseline in the intervention group but remained unchanged in the Control subjects. At baseline there was no difference but TG reduced significantly in the Intervention group at 4th week compared to the Control group. In each group there was no significant difference between baseline and after 4th weeks of egg consumption. LDL-C was significantly more in the Intervention group at baseline than controls. At the end of 4th week, it was significantly reduced in Intervention group but remained unchanged in Controls so that there was no statistically significant difference between the two groups. At baseline and after 4th week of egg consumption, there was no significant difference of HDL-C between the two groups. After 4th week of study period HDL-C was significantly reduced in the Controls and there was no significant difference in Intervention group compared to baseline.

Table-II: Comparison of effect of egg on serum TC between study groups (mg/dL)

Study groups	Baseline Mean ±SD	At the end of 4th week Mean ±SD	P -value*
Control Group (n=40)	169.22 ±19.25	169.35 ±19.22	0.963
Intervention Group (n=40)	179.52 ±15.59	173.35 ±14.91	0.001
P- value**	0.01	0.30	

*Paired't' test, **Unpaired't' test

Table-III: Comparison of effect of egg on serum TG between study groups (mg/dL)

Study groups	Baseline Mean±SD	At the end of 4th week Mean±SD	P -value*
Control Group (n=40)	136.75 ±13.74	141.12 ±12.09	0.098
Intervention Group (n=40)	126.15 ±18.48	130.18 ±14.85	0.077
P -value**	0.372	0.005	

Paired't' test, **Unpaired't' test

Table-IV: Comparison of effect of egg on serum LDL-C between study groups (mg/dL)

Study groups	Baseline Mean ±SD	At the end of 4th week Mean ±SD	P -value*
Control Group (n=40)	99.95 ±19.33	100.55 ±19.97	0.846
Intervention Group (n=40)	111.15 ±13.80	106.18 ±13.80	0.001
P -value**	0.002	0.155	

*Paired't' test, **Unpaired't' test

Table-V: Comparison of effect of egg on serum HDL-C between study groups (mg/dL)

Study groups	Baseline Mean ±SD	At the end of 4th week Mean ±SD	P -value*
Control Group (n=40)	41.87 ±1.67	40.42 ±3.47	0.006
Intervention Group (n=40)	42.27 ±2.03	41.10 ±4.34	0.84
P -value**	0.362	0.445	

*Paired 't' test, **Unpaired 't' test

Discussion

Dietary guideline to prevent cardiovascular diseases emphasizes on reduction of dietary cholesterol intake <300 mg/d for healthy adults or <200 mg/d for persons with elevated cholesterol or heart disease[8]. Consumption of eggs is restricted due to its high cholesterol contents. In addition to cholesterol, egg yolk also contains predominantly unsaturated fatty acids that might have favorable influence in reducing serum cholesterol level. Though cholesterol and eggs should be matter of more concern among middle aged people due to highr prevalence of cardiovascular diseases, yet young people are also discouraged for daily egg consumption by parents in spite of having nutrient rich contents. This study was aimed to evaluate effect of daily egg consumption on serum lipid profile in young adults.

In this study the age of the subjects of the Intervention group was 21.95 ± 3.32 years and that of Control subjects was 23.20 ± 4.18 years. There were 21 (52.5%) males and 19 (47.5%) females in the Intervention group; whereas 20 (50.0%) males

and 20 (50.0%) females in the Control group. SBP was 113.75±8.38 & 115.88 ±6.69 mmHg; DBP was 75.75±5.01 & 77.12±4.51 Hg in Intervention and Control groups respectively. BMI was 22.00 ±2.11 & 22.30±1.51 in the Intervention and Control groups respectively. There was no significant difference of age, sex distribution, BP and BMI between the two study groups. This result was similar to the study of Techakriengkrai et al.[15].

In the present study serum total cholesterol was significantly decreased from baseline to end of 4th week in the Intervention group (p=0.001), whereas in the Control group there was no change of TC at the end of 4th week (p=0.963). Similarly serum LDL-C was significantly decreased from baseline to end of the 4th week among egg consumers (Intervention group, p=0.001), but not among Control subjects (p=0.846). This result was consistent with the study of Techakriengkrai et al.[15], but it was different from some studies where there was no significant change of TC and LDL-C after 4 weeks of consumption of one egg daily[13,16], and 3 eggs per day[17]. In our study, initially serum TC and LDL-C concentration was more in the Intervention group than Controls. After 4 weeks of daily one egg consumption, TC and LDL-C was reduced in the Intervention group and remained unaltered among Control subjects. This finding indicates that there might have lowering effect of eggs on TC and LDL-C, due their unsaturated fatty acid contents.

In our study the serum triglyceride was similar at baseline and end of 4th week in both Intervention (p=0.077) and Control groups (p= 0.098). This result was consistent with some studies[13,15,17]. However, in our study, serum TG level was significantly increased in the Control group compared to the Intervention group at the end of 4th week (P=0.005). Statistically significant increase of TG among Control subjects may be due to their unrestricted intake of carbohydrates and fats other than eggs. Relatively less increase of TG in the Intervention group may probably be due to some lowering effects on TG when one egg is added to daily diet.

This study showed that the serum HDL-C did not differ significantly between baseline and end of 4th week in the Intervention group (p=0.084), whereas serum HDL-C was significantly decreased from baseline to end of 4th week among controls (p=0.006). This result compares favorably with several other studies[13,15,17]. Probably eggs have no effect on HDL-C. Significantly reduced HDL-C mong Controls may be inherently related to existing unhealthy food habits due to ignorance of nutritional facts that is not friendly to cardiovascular well being.

The results of this study show that consumption of one egg per day decreases TC and LDL-C but do not affect HDL-C and serum triglyceride levele among young healthy adults. It may be concluded that daily consumption of one egg does not unfavorably influence the lipid profile parameters among young healthy adults.

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