

Original Article

Quail eggs consumption and the levels of glucose, lipid profile in healthy students of Nnamdi Azikiwe University, Nnewi

Nwankwo Emilia¹, Meludu Samuel Chukwuemeka¹, Dioka Emmanuel C², Nnodim Johnkennedy^{*3} and Ezeugwunne Pricilla¹

¹Department of Human Biochemistry, Faculty of Basic Medical Sciences Nnamdi Azikiwe University Nnewi campus.

²Department of Chemical pathology, Faculty of Medicine Nnamdi Azikiwe University Nnewi campus.

³Department of Medical Laboratory Sciences, Faculty of Health Sciences, Imo State University Owerri, Nigeria

*Corresponding Author

Dr. Nnodim Johnkennedy
Department of Medical Laboratory Sciences,
Faculty of Health Sciences,
Imo State University Owerri, Nigeria
E-mail: akramon1@hotmail.com

Keywords:

Quail eggs,
Glucose,
Lipid profile,
Students,
Nnewi

Abstract

Aim: The present study was design to determine serum glucose and lipid profile level of triglyceride, total cholesterol, high density cholesterol, low density lipoprotein, very low density lipoprotein following the consumption of cooked quail eggs by apparently healthy students.

Materials and Methods: This is an experimental study comprising 37 volunteered students, out of which are 20 females and 17 males within the age of 18±35years respectively. They were fed with three cooked quail eggs every morning for 21 days. 3ml of fasting blood were collected before the intake of cooked quail eggs for baseline, 10th day, and 21st day respectively. The serum levels of glucose and lipid profile were determined using standard methods.

Results: The result showed that the serum total cholesterol and low density lipoprotein-cholesterol decreased significantly at 10th day and 21st day following consumption of cooked quail eggs when compared with the baseline levels ($p < 0.05$). While High density lipoprotein - cholesterol increased significantly at 21st day following consumption of cooked quail eggs when compared with the baseline level ($p < 0.05$). Glucose, triglyceride and very low density lipoprotein cholesterol did not differ at 10th day and 21st day following consumption of cooked quail eggs when compared with the baseline ($p > 0.05$).

Conclusion: The implication of this finding suggest that regular consumption of cooked quail eggs may decrease diabetic and cardiovascular risk due to its ability to significantly decrease TC, LDL-C. increase HDL-C and TG. VLDL. glucose not differed.

1. Introduction

Quail eggs are highly nutritious, containing essential minerals and vitamins and antioxidants. The average egg from mature female weighs about 11.05 grams. Even with their small size, the nutritional value of quail eggs is 3 - 4 times greater than chicken eggs [1]. The nutritional values of quail eggs are much higher than those offered by other eggs [2]. Unlike chicken eggs, quail eggs have not been known to cause allergy [3]. Foods are not intended to only satisfy hunger and provide necessary nutrients for humans. It is also required for the prevention of nutrition-related diseases, body maintenance and mental wellbeing of its consumers [4]. Chinese traditional doctors use quail eggs in treatment of various diseases [1].

Quail eggs have high fat but most of them were unsaturated fatty acid which is better for health [1]. Regular consumption of food rich in saturated fatty increases low density lipoprotein cholesterol [5]. Based on such evidence and evidence implicating low HDL and high LDL levels in cardiovascular disease (see Hypercholesterolemia), many health authorities advocate reducing LDL cholesterol through changes in diet in addition to other lifestyle modifications [6]. Elevated glucose levels are treated with a strict diet consisting of proteins. Elevated cholesterol levels are treated with a strict diet consisting of low saturated fat, trans fat-free, low cholesterol foods [7].

The rate of death due to cardiovascular diseases among persons 15 to 59 years of age is 3 to 8 times as high in Tanzania and Nigeria as in England and Wales [8]. The identification and utilization of foods that may maintain the balance between cardiovascular parameters will be of great help to those populations affected. Quail eggs are highly nutritious, containing essential minerals, vitamins, amino acids, proteins, and antioxidants with high medicinal values than those offered by other eggs. It is in the light of this that the effects of consumption of cooked quail eggs on glucose and lipid profile, were

evaluated in some students of Nnamdi Azikiwe University, Nnewi Campus, Anambra State.

2. Materials and Methods

2.1 Study areas

This work was carried out in the College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus, located in Okofia Nnewi, Anambra State, while the biochemical analysis was done in Chemical Pathology Laboratory, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State and Springboard Research Laboratories, Awka, Anambra State.

2.2 Study population

Thirty- seven (37) apparently healthy subjects, within the age range of 18-35 years were recruited for the study. They are within the age range of 18-35 years. Maximum compliance was ensured by marking attendants of my subjects every morning in my office and by going to their hostel during weekends. Subjects were recruited from the students of the College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus. Only those that gave their informed consent after the due explanation of the study were recruited for the study. This study was approved by the Ethics Committee of Faculty of Basic Medical Sciences, College Health Sciences, Nnamdi Azikiwe University, Nnewi Campus.

2.3 Preparation and administration of quail eggs

Quail eggs were bought from Chuks Agro Business Ventures, at No 10 Nwafor Orizu Avenue, Obinuo Otolu, Nnewi. A Zoologist properly certified the quail eggs. The quail eggs were cooked for one hour. The cooked quail eggs (3pieces) were given to each subject between 8a.m-9.30a.m every morning for 21days. Only the egg yolk and egg white was consumed.

2.4 Sample Collection

Three (3) ml of fasting blood was collected from each subject at baseline, 10th day and 21st day following the consumption of quail eggs. One ml of the blood was dispensed into the fluoride oxalate bottle for fasting plasma glucose analysis, while the remaining 2 ml were dispensed into plain bottles and allowed to clot, retracted and centrifuged for 5 minutes at 3000 rpm. The serum was then collected into another sterile plain container and stored frozen at -20 °C until analysis of other biochemical parameters.

2.5 Analytical Methods

Total cholesterol was determined by the method of Allain et al [7] while HDL-cholesterol was determined by the method of Crouse

(1985). Triglycerides and low density lipoprotein was determined by the method of Tietz [14] and Friedwald et al respectively. Also, plasma glucose was determined by the glucose oxidase method of Tietz [15].

2.6 Statistical Analysis

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 21. The values are presented as mean ± SD, and paired t- test was used to analyze two related variables while independent t-test was used to analyze two independent variables. P<0.05 was taken as level of significance.

3. Results

Table 1: Levels of lipid profile at baseline, 10th and 21st day following the consumption of cooked quail eggs (mean ± S.D; n =37).

Parameters	TC (mmol/l)	TG (mmol/l)	HDL-C (mmol/l)	LDL-C (mmol/l)	VLDL-C (mmol/l)	FPG (mmol/l)
Baseline (A)	4.45±0.62	0.74±0.24	1.19±0.17	2.92±0.62	0.34±0.11	4.60±0.39
10 th day (B)	4.17±0.53	0.74±0.19	1.22±0.20	2.61±0.45	0.34±0.09	4.76±0.50
21 st day (C)	4.17±0.53	0.81±0.23	1.29±0.50	2.51±0.21	0.37±0.10	4.77±0.41
p-values	AvB=0.04	0.94	0.59	0.02	0.94	0.12
	AvC= 0.04	0.19	0.04	0.00	0.19	0.10
	BVC=0.98	0.16	0.13	0.34	0.16	0.94

Key: From the result of lipid profile, TC and LDL-C level decreased significantly at 10th and 21st day following quail egg consumption compared with their baseline levels (p<0.01). HDL-C level increased significantly at 21st day compared with the baseline level (P<0.01). The levels of fasting plasma glucose, TG and VLDL-C at baseline, 10th and 21st day did not differ significantly (p>0.05).

Table 2: Levels of lipid profile in male and female subjects at baseline, 10th day and 21st day following the consumption of cooked quail eggs (mean±SD; male = 20, female = 17)

Groups	TC (mmol/l)	TG (mmol/l)	HDL-C (mmol/l)	LDL-C (mmol/l)	VLDL-C (mmol/l)	FPG (mmol/l)
Baseline						
Male	4.58±0.76	0.75±0.19	1.20±0.17	3.04±0.72	0.34±0.88	4.58±0.38
Female	4.29±0.37	0.72±0.28	1.18±0.18	2.77±0.45	0.33±0.13	4.62±0.41
t-test	-1.45	-0.33	-0.34	-0.30	-0.29	0.33
p-value	0.16	0.75	0.74	0.20	0.78	0.74
10 th day						
Male	4.27±0.53	0.71±0.17	1.23±0.19	2.71±0.43	0.33±0.08	4.76±0.59
Female	4.05±0.53	0.78±0.22	1.20±0.21	2.50±0.47	0.35±0.10	4.76±0.39
t-test	-0.21	0.98	-0.50	-1.39	0.94	-0.01
p-value	0.23	0.33	0.62	0.17	0.35	0.10
21 st day						
Male	4.11±0.61	0.77±0.23	1.28±0.22	2.47±0.58	0.35±0.11	4.71±0.37
Female	4.25±0.48	0.85±0.23	1.30±0.10	2.56±0.40	0.39±0.10	4.84±0.45
t-test	0.78	1.12	0.26	0.51	1.12	0.93
p-value	0.44	0.27	0.80	0.61	0.27	0.36

KEY: The mean serum levels of TC, TG, HDL-C, LDL-C, VLDL-C, and FPG did not differ significantly between male and female subjects at baseline, 10th day and 21st day following cooked quail eggs consumption (p>0.05).

4. Discussion

Traditional assumptions that dietary cholesterol consumption translates directly into elevated plasma cholesterol levels and the development of cardiovascular diseases in all individuals were deemed to be mistaken [9-11]. First, a conservative estimate suggests that only 30% of the population would hyper-respond to dietary cholesterol [12], whereas approximately 70% of humans are hypo-responsive to excess dietary cholesterol consumption [13].

This study showed significant decrease in the levels of TC and LDL-C and significant increase in the levels of HDL-C following 21st day of cooked quail egg consumption. These findings collaborate the statement of Rong et al[11] that the traditional assumptions that dietary cholesterol consumption translates directly into elevated plasma cholesterol levels no longer holds. It also collaborate with the findings that quail eggs are rich in unsaturated fatty acid than saturated fatty acid by Tunsaringkarn et al[1]. This finding implies that cooked quail eggs have the tendency to reduce cardiovascular disease risk of any individual who includes it in his dietary food. This suggests that patients with metabolic syndrome may benefit from the consumption of cooked quail egg.

High density lipoprotein-cholesterol is cardio protective not only because of the reverse cholesterol transport system, which helps to remove cholesterol from peripheral tissues, but also because of the mechanisms that include increased atherosclerotic plaque stability, protection of LDL from oxidation and maintaining the integrity of the vascular endothelium. They stated that large numbers of HDL-C particles correlates with better health outcomes whereas low numbers of HDL-C particles is associated with atheromatous disease progression

in the arteries. So regular consumption of cooked quail egg may increase HDL-C in females and males, thereby reducing their risk to atheromatous disease progression in the arteries. Consumption of cooked quail eggs for 21 days was able to increase the serum levels of HDL, but decreased serum levels of TC, LDL, serum level of glucose, VLDL, TG did not differ significantly in apparently healthy students. This suggests that regular consumption of cooked quail eggs may reduce cardiovascular risk parameters. It may also be eaten by diabetics' patients as source of protein like beans.

References

- [1] Tunsaringkarn T, Tungjaroenchai W, Siriwong W. Nutrient benefits of Quail (*Coturnix coturnix japonica*) eggs. *International Journal of Scientific and Research Publications*; 2013: 3(5).
- [2] Lalwani P.(2011). Quail Egg Nutrition.<http://www.buzzle.com/articles/quail-egg-nutrition.html> (Accessed 15th April 2012).
- [3] Ihejiri K. (2012). Quail Farming in Nigeri. *A Journal*; Pp 34.
- [4] Siró, Kápolna E, Kápolna B, Lugasi A. (2008). Functional food. Product development, marketing and consumer acceptance -A review. *Appetite*; 51, 456-467.
- [5] Vitalhealthzone. (2007c). Aspartic acid amino acid. [Http://www.vitahealthzone.com/nutrition/amino-acid/Aspartic-acid/html](http://www.vitahealthzone.com/nutrition/amino-acid/Aspartic-acid/html). (Accessed 9th June, 2012).
- [6] National Health Service. Retrieved 2010-09-14."High cholesterol levels by NHS".
- [7] Allain CC, Poon LS, Chan CSG, Richmond W, Fu PC. Enzymatic determination of total serum cholesterol. *Clinical Chemistry* 1974; 20: 470-475. American Heart Association. Retrieved 2009-02-21.

- [8] Reddy KS. Cardiovascular disease in developing countries: dimensions, determinants, dynamics and directions for public health action. *Public Health and Nutrition* 2002; 5(23): 18.
- [9] Hu FB, Stampfer MJ, Rimm EB, Manson JE, Ascherio A, Colditz GA, Rosner BA, Spiegelman D, Speizer FE, Sacks FM. A prospective study of egg consumption and risk of cardiovascular disease in men and women. *JAMA- Journal American Medical Association*; 1999; 281: 1387-1394.
- [10] Natoli S, Markovic T, Lim D, Noakes M, Kostner K. Unscrambling the research. Eggs, serum cholesterol and coronary heart disease. *Nutrients Diet*; 2007; 64: 105-111.
- [11] Rong Y, Chen L, Zhu T, Song Y, Yu M, Shan Z, Sands A, Hu FB. Egg consumption and risk of coronary heart disease and stroke: Dose-response meta-analysis of prospective cohort studies. *British Medical Journal*; 2013; 346: 8539-8551.
- [12] Weggemans RM, Zock PL, Katan MB. Dietary cholesterol from eggs increases the ratio of total cholesterol to high-density lipoprotein cholesterol in humans: A meta-analysis. *American Journal Clinical Nutrition* 2001; 73: 885-891.
- [13] McNamara DJ. The impact of egg limitations on coronary heart disease risk: Do the numbers add up? *Journal American College. Nutrients*; 2000; 19: 540-548.
- [14] Tietz NW. *Fundamentals of Clinical Chemistry*, WB. Saunders Co., Philadelphia; 1976; Pp 903.
- [15] Tietz NW. *Fundamentals of Clinical Chemistry*, Philadelphia, WB Saunders 1973.