INTERNATIONAL JOURNAL OF PHARMACOLOGY AND THERAPEUTICS
eISSN 2249 – 6467

Research Article

QUAIL EGGS CONSUMPTION AND THE LEVELS OF SELECTED MINERAL IN HEALTHY STUDENTS OF NNAMDI AZIKIWE UNIVERSITY, NNEWI.

Nwankwo Emilia[1], Meludu Samuel Chukwuemeka[1], Dioka Emmanuel C [2], Nnodim Johnkennedy[3], Ezeugwunne pricilla[1]

1. Department of Human Biochemistry, Faculty of Basic Medical Sciences Nnamdi Azikiwe University Nnewi campus.
2. Department of Chemicalpathology, Faculty of Medicine Nnamdi Azikiwe University Nnewi campus.
3. Department of Medical Laboratory Sciences, Faculty of Health Sciences, Imo State University Owerri, Nigeria

Corresponding author: - Dr Johnkennedy Nnodim

ABSTRACT

Aim:The present study was design todetermine the serum levels of selected minerals (Fe, Ca, Se, Mg, P and Zn)following the consumption of cooked quail eggs by apparently healthy students.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 ofFe, Ca, Se, Mg, P and Zn were determined using standard methods. Results:The result showed that the serum Zinc and magnesium levels increased significantly at 10th and 21st day compared with the baseline level ($p=0.01$). However, the levels of calcium, selenium, iron, inorganic phosphorus increased significantly at 21st day compared with their baseline ($p=0.01$)following consumption of cooked quail eggs.The mean serum levels of Mg, Ca, P, Fe, Zn and Se did not differ significantly between male and female subjects at baseline, 10th day and 21st day following cooked quail eggs consumption. ($p>0.05$).Conclusion:The implication of this finding suggest that regular consumption of cooked quail egg might serve as a good supplement for patients suffering from iron deficiency anemia. The increased levels of Ca, Mg and P found in this study showed that the population may benefit immensely by consuming cooked quail eggs as these minerals play important role in bone metabolism.

Key words: Quail eggs, consumption, mineral

INTRODUCTION

Quail eggs are highly nutritious, containing essential minerals and vitamins and antioxidants. The average egg from mature female weighs about 11.05grams. 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]. While the focus in health supplements is often on vitamins, many of the trace minerals are necessary in order for our bodies to actually absorb vitamins and other nutrients properly [5].Various trace minerals serve as catalysts or necessary ingredients in electrical or chemical reactions in the body.Magnesium serves several important functions in the human body, including intracellular signaling, serving as a cofactor for protein and DNA synthesis, oxidative phosphorylation, cardiovascular tone, neuromuscular excitability, and bone formation[6,7]. The interest on calcium requirements during the last decade has been expanded to apply to the entire life cycle from birth through elder years. Apart from providing strength to bones and teeth, other health benefits of phosphorus is important in helping our body perform essential activities for different body parts like brain, kidney, heart and blood. The most essential mineral of whole quail eggs was nitrogen (6.36%) which it was mostly in egg whites (12.2%)[8].Nitrogen functions as the component of nucleic acids, proteins, hormones, coenzymes [9].In addition, most trace minerals in whole quail eggs were iron and zinc which were higher in egg yolks. The enrichment of zinc would be benefit for reduction of diarrhea and pneumonia mortality in children [10]. Iron has many functions in the body and is also important for maintaining a healthy immune system which is essential for blood to work efficiently. Iron functions as haemoglobin in the transport of oxygen. Iron deficiency could lead to anemia. Iron deficiency anemia is probably the most common nutritional disease in the world, affecting at least five hundred million people. On the hand, zinc is involved in well over one hundred different reactions in the body. Some of these reactions are keys in DNA synthesis [11]. There is high rate of malnutrition and deficiency of some essential macro and micro minerals in Nigeria with their attendant consequences especially in some people with chronic diseases such as diabetes mellitus and chronic kidney disease[9]. Identification and utilization of foods and supplements that are rich in these substances may serve as good source of nutrition as well as replacement of these deficient minerals.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.

MATERIALS AND METHODS:

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.

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 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.

PREPARATION AND ADMINISTRATION OF QUAIL EGGS.

Quail eggs were bought from Chuks Agro Business Ventures, at No 10 Nwafor Orizu Avenue, Obinuo Otolo, 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.

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. It was 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 biochemical parameters.

ANALYTICAL METHODS

Zinc,Magnesium, and Seleniumwas determined by Atomic Absorption Spectrophotometry[12] While iron was determine y standard method. The direct colorimetric determination of calcium in serum was done by the method of Chen[13].Inorganic phosphorus was determined by the method of Tietz[14].

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.

RESULTS

Table 1.1**:** Levels of micro and macro minerals at baseline, 10th and 21st day following the consumption of cooked quail eggs(mean ± S.D; n =37).

Parameters	Mg (mmol/l)	Ca (mmol/l)	Zn (ug/dl)	Se (ug/dl)	Fe (Mg/dl)	P (mmol/l)
Baseline (A)	0.98±0.10	2.17±0.15	86.90±11.91	8.92±2.50	94.31±12.68	1.11±0.18
10th day (B)	1.16±0.12	2.19±0.13	97.27±11.99	9.27±2.18	112.27±66.61	1.17±0.30
21st day (C)	1.19±0.09	2.24±0.14	107.76±18.18	12.53±4.89	128.94±20.54	1.30±0.26
p-values	AvB=0.00	0.44	0.00	0.52	0.10	0.25
	AvC=0.00	0.04	0.00	0.00	0.00	0.00
	BVC=0.15	0.18	0.00	0.00	0.14	0.06

Key: Zinc and magnesium levels increased significantly at 10th and 21st day compared with the baseline level (p=0.01). However, the levels of calcium, selenium, iron, inorganic phosphorus increased significantly at 21st day compared with their baseline (p=0.01).

Table 1.2: Levels of macro and micro minerals 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	Mg (mmol/l)	Ca (mmol/l)	P (mmol/l)	Fe (mg/dl)	Zn (ug/dl)	Se (ug/dl)
Baseline	Male	0.97±0.91	2.15±0.12	1.14±0.20	91.49±11.03	89.27±11.01	9.04±2.10
	Female	0.99±0.12	2.19±0.18	1.09±0.14	84.11±12.65	84.11±12.6	8.78±2.97
	t-test	0.64	0.86	-0.85	1.49	-1.33	-0.31
	p-value	0.53	0.40	0.40	0.15	0.19	0.76
10th day	Male	1.15±0.13	2.19±0.12	1.17±0.38	107.42±16.22	95.51±10.39	2.57±0.57
	Female	1.18±0.12	2.20±1.14	1.17±0.17	101.51±29.39	99.34±13.67	9.75±1.85
	t-test	0.80	0.23	0.00	0.66	0.97	1.19
	p-value	0.43	0.82	0.10	0.62	0.34	0.24
21st day	Male	1.17±0.08	2.22±0.14	1.28±0.27	141.68±13.63	107.98±16.6	12.39±4.9
	Female	1.21±0.91	2.26±0.13	1.32±0.25	139.84±22.25	107.98±20.4	12.70±4.9
	t-test	1.38	0.94	0.51	0.07	0.09	0.19
	p-value	0.18	0.36	0.61	0.98	0.95	0.85

KEY: The mean serum levels of Mg, Ca, P, Fe, Zn and Se did not differ significantly between male and female subjects at baseline, 10th day and 21st day following cooked quail eggs consumption. ($p>0.05$).

DISCUSSION

This study showed significant increase in the levels of Mg, Ca, P, Zn, Se, and Fe at 21st day following cooked quail eggs consumption when compared with their baseline levels. This might be as a result of high content of essential minerals in quail eggs[15,17]. The increased level of Zn collaborates with the findings that quail eggs are rich in Zn[1]. This might serve as a good supplement for patients suffering from iron deficiency anemia. Iron deficiency anemia which is probably the most common nutritional disease in the world, affects at least five hundred million people especially in developing countries [9] may be drastically reduced by simple inclusion of this egg in the diet.

It may also be of medicinal value to amenorrhea, female athlete triad, postmenopausal women,and individuals with milk allergy or lactose intolerance who are at risk for dietary mineral deficiency. It is characterized by insufficient bone calcification. However, post menopausal women due to hormonal changes that may affect bone mineralization processes have also been widely studied for calcium deficiency risk [17]. The increased levels of Ca, Mg and P found in this study showed that this population may benefit immensely by consuming cooked quail eggs as these minerals play important role in bone metabolism.

Quail egg consumption may also improve the levels of antioxidants and immune function considering the functions of Zn and Se in antioxidant systems as well as in immune systems. Zn plays a critical structural role for antioxidant enzyme superoxide dismutase and can stabilize biological membranes to decrease their susceptibility to oxidative damage that can impair cell functions. Selenium acts as an antioxidant and peroxynitrite scavenger when incorporated into selenoprotein. It is the main element in glutathione peroxidase (an antioxidant) that reduces formation of free radicals and peroxidation of lipoproteins [18]. The biological functions

associated with Se include male fertility, prevention of cancer, cardiovascular disease, viral mutation, endocrine and immune function as well as modulating inflammatory response [19]

REFERENCES

1.Tunsaringkarn T, Tungjaroenchai W, Siriwong W. (2013). Nutrient benefits of Quail (Coturnix coturnix japonica) eggs. *International Journal of Scientific and Research publications*; 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 Nigeria. *A Journal; 34-36.*
4. Siró, Kápolna E, Kápolna B, Lugasi A. (2008). Functional food. Product development,marketing and consumer acceptance -*A review. Appetite;51*, 456–467.
5. Choi YS, Joung H, Kim J. (2013). Evidence for revising calcium dietary reference intakes (DRIs) for Korean elderly.Faculty of Agricultural Sciences and Environmental Biology Journal; 27:1065.28.
6.Whang R, Hampton EM, Whang DD. (1994).Magnesium homeostasis and clinical disorders of magnesium deficiency. *Annual Pharmacotherapy; 28: 220–226.*
7.Konrad M, Schlingmann KP, Gudermann T. (2004). Insights into the molecular nature of magnesium homeostasis. *American Journal Physiology Renal Physiology 286: F599–F605.*
8. AyukJ, GittoesNJ. (2011).How should hypomagnesaemia be investigated and treated? *Clinical Endocrinology; 75: 743–746.*
9.Soetan KO, Olaiya CO, Oyewole OE. (2010). The importance of mineral elements for humans, domestic animals and plants: A review. *African Journal of Food Science;* 4(5),200-222.
10.Hida A, Hasegawa Y, Mekata Y, Usuda M, Masuda Y, Kawano H, Kawano Y. (2012).Effects of egg white protein supplementation on muscle strength and serum free amino acid concentrations. Nutrients*;4*, 1504–1517.
11. Debjit BC, Sampath KP. (2010). A potential medicinal importance of zinc in human health and chronic disease. *International Journal of Pharmaceutical and Biomedical Sciences*;1(1)05-11.
12. Burtis CA, Ashwood ER. (2003). Trace elements. Tietz fundamentals. Saunders, India. Pp.570-575.
13.Chen PS, Toribarat TY, Warner H. (1954).Micro determination and Analytical Chemistry; 26:1967.
14. Tietz NW. (1976). Fundamentals of Clinical Chemistry, WB. Saunders Co.,Philadephia;Pp 903.
15.Samman S, Kung FP, Carter LM, Foster MJ, Ahmad ZI, Phuyal JL, Petocz P. (2009). Fatty acid composition of certified organic, conventional and omega-3 eggs. *Food Chemistry; 116*, 911-914.
16. Fraeye I, Bruneel C, Lemahieu C, Buyse J, Muylaert K, Foubert I. (2012). Dietary enrichment of eggs with omega-3 fatty acids. A review. Food Reserve International*; 48*, 961–969.
17.Bonjour JP, Kraenzlin M., Levasseur R, Warren M, Whiting S. (2013). Dairy in adulthood: from foods to nutrient interactions on bone and skeletal muscle health. Journal American College Nutrition; 32:251–263.
18.O'Dell BL. (2000). Role of Zinc in plasma membrane function. *Journal Nutrition;* 130:1432-6S.
19.Arthur CG, John EH. (2006). Testosterone. In: Arthur CG, John EH, eds. Textbook of MedicalPhysiology, 11th edition, Philadelphia: Elsevier Saunders; Pp 987- 1003.