IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 10, Issue 1 Ver. I (Jan. 2016), PP 57-59
www.iosrjournals.org

Comparative Evaluation of Nutritional Values of Guinea Fowl, Duck and Quail Eggs

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Abstracts: *Guinea fowl, quail and duck eggs were compared in three phases, whole, yolk and white in term of their proximate and mineral composition. The whole guinea fowl had the highest moisture content of 72 .5% compare to the whole duck (69.85%) and the whole quail (67.07%), the moisture content of egg white ranged between (82.63- 87.39%) across the sample but higher than that of the yolk which ranged between (44.74-49.85%). High percentage of protein was found in the yolk of guinea fowl egg and duck egg, but low in the white of quail egg. The three samples were rich in fat, but the highest value of fat content was noticed in the yolk of duck (36.13%), they all had low carbohydrate content which was not significantly different from each other in term of whole, yolk and white. The samples were all rich in calcium but high content (46.10%) was noticed in whole quail, while sodium, zinc and iron for each of the sample were not significantly different from each other but the yolk of guinea fowl had the highest value of zinc (6.60 mg/100g), copper (5.60 mg/100g) respectively.*
Keywords: *Fowl, duck, guinea, quail, yolk, egg*

I. Introduction

Egg constitutes well-known sources of high biological value protein, phospholipid, essential amino acids and vitamins for the human diet. When used for fruits such as Mayonnaise, salad dressing meringue, soufflé, constituents as emulsifiers or foaming and gelling agents. (Kiosscogloa and Sherman 1983; Baldwin, 19868).A quantitative knowledge of the functional properties of egg yolk constituent is useful in determining the various ways of application of yolk in food system. Egg yolk apart from its combination to human dietary requirements by supplying high quality protein, minerals, vitamins and essential fatty acids is also employed in food industries for its emulsifying and foaming as well as other functional properties. (Dyer-Hurdon and Nnanna, 1993). Egg yolk have been reported to have a lipid to protein ratio of about 2:1 (Chung and Ferrier (1991). The major component includes phospholipids, triacylglycerol and cholesterol. Egg yolk is rich in phospholipids, it should be a good source of industrial lecithin which is used as emulsifiers in food processing and cosmetics formulation, According to these authors, egg yolk also contain other bioactive component such as phosvitin, livetins and biotin binding properties. The egg also represents an important source of energy protein and other nutrients for humans and their rational consumption stimulates the metabolic functions in the body and increase resistance to disease. Quail egg are packed with minerals and vitamins even in their small size, their nutritional value is three to four times greater than chickens eggs while guinea fowl eggs are considered as delicacy and have good flavour. Duck eggs can be used for baking, since they contain more albumen, which give them more structure, thus creating a very fluffy and rich baked good with higher lift than those made with chicken eggs. The objectives of this study are to evaluate the nutritional composition of guinea fowl egg, duck egg and quail egg.

II. Data Analysis

Determinations were carried out in triplicates for the proximate and the error was reported as standard deviation from the mean.

III. Materials And Methods

The eggs used for this work were purchased within the market of Ado Ekiti to ensure that freshly laid eggs were used for the experiment.

IV. Sample Preparation

The egg samples were carefully cracked and the yolk and white were carefully separated. The whole egg, the yolk and white part of egg of the three birds were subjected to proximate and minerals analysis.

V. Methods

The proximate composition was determined according to the procedure (AOAC, 2005). The nutritionally important minerals in the samples were determined using Atomic Absorption Spectrophotometer to analyze the following minerals: sodium, calcium, potassium, magnesium, copper, zinc, manganese, iron and phosphorous. The samples were coded s follows: GW1= whole egg of guinea fowl, GY1= egg yolk of guinea fowl, GWH1= egg white of guinea fowl, DW2= whole egg of duck, DY2= egg yolk of duck, DWH2= egg white of duck, QW3= whole egg of quail, QY3= egg yolk of quail, QWH3= egg white of quail.

VI. Result And Discussion

Table 1: Proximate composition for Guinea fowl, Duck and quail egg

Composition	(%) Ash	(%) Moisture content	(%) Crude fibre	(%) Protein	(%) Fat	(%) CHO
GW1	0.79±0.01	72.5±0.12	0.04±0.02	13.56±0.10	12.09±0.41	1.02±0.91
GY1	1.01±0.31	48.62±0.00	0.04±0.92	17.52±0.01	32.20±1.10	0.62±0.21
GWH1	0.64±0.08	87.1±0.31	0.02±0.00	11.53±0.07	0.04±0.00	0.67±0.11
DW2	1.09±0.00	69.85±1.16	0.04±0.10	14.02±0.12	14.39±0.11	0.61±0.45
DY2	1.24±0.14	44.73±0.72	0.05±0.09	17.17±0.65	36.13±1.12	0.68±0.34
DWH2	0.73±0.18	87.36±0.32	0.03±0.17	11.11±0.22	0.07±0.65	0.70±0.29
QW3	0.86±0.24	67.07±0.02	0.02±0.04	12.40±0.23	13.14±1.02	6.51±1.00
QY3	0.86±0.12	49.85±0.17	0.12±0.16	12.56±0.21	33.21±0.20	3.32±1.62
QWH3	0.64±1.09	82.63±0.14	0.08±0.33	14.96±0.46	0.02±0.10	1.75±0.09

Values in the table are mean ± standard deviation for three determinations.

From the result shown above in table 1, egg white of duck had the highest moisture content of (87.36%),) compare to the whole of duck egg (69.85%) and the whole of quail egg (67.07%), while the moisture content of the yolk egg of each of the birds ranged between (44.73- 49.85%), egg white ranged between (82.63-87.36%), although the percentage moisture content in the yolk of duck egg and guinea fowl egg was not significantly different. The protein content of each of the whole egg across the birds ranged between (12.40-14.0 2%) in which the whole duck egg had the highest value of protein (14.02%). The protein content in the egg yolk of each the bird also ranged between (12.56-17.52%) in which the egg yolk of the guinea fowl had the highest percentage of protein (17.52%) although this was significantly different from that of the duck egg. The fat content for the three samples (whole egg) ranges between (12.09-14.39%), percentage fat in the egg yolk was high especially in the egg yolk of duck (36.13%) with a corresponding low fat content of (0.07 %) in the egg white of duck which is an indication that duck had the highest fat content. The carbohydrate content across the three samples (whole eggs) ranges between (0.61- 6.51%) with a corresponding high content (3.32%) of carbohydrate in the yolk of quail egg which was higher than that present in the egg yolk and egg white of guinea fowl (0.62%, 0.67%) and duck (0.68%, 0.70%).

Table 2 Mineral composition analysis (mg/100g)

Composition	Sodium	Potassium	Calcium	Magnesium	Zinc	Iron	Copper
GW1	21.60	11.20	43.50	23.80	4.00	1.80	2.00
GY1	10.50	6.50	37.20	18.40	6.60	1.60	5.60
GWH1	5.30	3.50	21.30	22.00	0.20	1.00	3.80
DW2	24.60	13.20	45.20	19.60	3.80	1.60	2.80
DY2	12.30	8.50	39.50	26.20	4.50	0.80	1.80
DWH2	4.20	1.30	22.20	21.80	0.20	1.02	0.40
QW3	22.30	8.50	46.10	25.80	3.50	1.75	4.20
QY3	10.20	6.30	38.40	19.40	5.00	1.70	1.60
QWH3	6.60	2.50	28.60	0.30	1.03	2.60	2.60

From the table 2, it was observed that sodium, potassium, calcium, magnesium, zinc, iron and copper in the whole egg sample ranged between (21.60- 24-60,100mg/g), (8.50-11.20 100mg/g), (43.50- 45-20 100mg/g), 23.80-25.80 100mg/g, 3.50-4.00 100mg/g, 1.60-1.80 100mg/g, 2.00-4.20 100mg/g respectively. Sample DW2 had the highest value of sodium, and potassium, while calcium and zinc are predominant in QW3 but not significantly different from DW2. Also, it was observed that sodium and potassium in the GY1 and QY3 was not significantly different from each other but lower than that of DY2 (8.50, mg/100g), potassium was low in DWH2 (1.30, mg/100g) and QWH3 (2.50, mg/100g) compare with GWH1 (3.50, mg/100g), although still low compare to the RDA standard. From the table above it was also observed that the value of calcium in GW1, GY1, GWH1 was; (43.50, mg/100g), (37.20 mg/100g), (21.30 mg/100g) respectively but lower compare to the value in DW2, (45.20, mg/100g), DY2 (39.50 mg/100g), DWH2 (22.20 mg/100g) respectively in which the

later was not significantly different from QW3, QY3 and QWH3. It was also observed that zinc was high in GW1 (4.00 mg/100g) compare to DW2 and QW3, while Zinc was high in QY3 (5.00 mg/100g) than DY2 (4.50 mg/100g) but less in GWH1, DW2 and QW3. However, the value of Iron was less in all the samples except in QWH3 (2.60 mg/100g), while the value of Iron in other samples ranged between (0.80-1.80 mg/100g), this still falls within the standard acceptable range of iron in any food sample.

VII. Conclusion

It could be concluded that the eggs of the three samples were rich in protein, fat, calcium and sodium. However, the yolk of guinea fowl and yolk of duck contain high proportion of sodium, potassium and iron. The whole Guinea fowl can be recommended for infants and children for proper growth and good bone development.

Acknowledgement

I appreciate my Head of department who allowed me to carry out my bench work in the departmental Laboratory.

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