IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Comparative study on Nutritive Value of White and Brown Eggshell powder and Formulation of Value Added Cookies

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Abstract

Calcium plays a key role in the treatment and prevention of bone demineralization. A widely used calcium enrichment source is purified CaCO3 with a high calcium content (about40%). Chicken eggshell powder, with a calcium content of about 38%, is a promising but little known source of calcium for human nutrition. The use of chicken eggshell powder might be beneficial, it could increase bone density and reduce pain in patients with osteoporosis. Eggshell calcium is probably the best natural source of calcium and it is about 90% absorbable. With the above context, the present study was undertaken, to analyse the Nutritive value of White eggshell powder and Brown eggshell powder and to formulate the Cookies with the incorporation of Egg shell powder. On basis of Physical characteristics, the eggs were selected for study, and their Nutrient content were assessed. The white and brown egg shell powder were incorporated into cookies and the value added products were formulated. Sensory quality is a combination of different senses of perception coming into play in choosing and eating a food. Hence, the Cookies prepared by incorporating both eggshell powder were evaluated for their sensory characteristics. The eggshell incorporated cookies were prepared and demonstrated among the different age groups viz., adolescents, adults, old age. This popularization among different communities created awareness about the nutritive value of both brown eggshell and white eggshell. The study revealed 8g of white eggshell powder was incorporated with 117g Maida for preparing Cookies was highly acceptable by semi trained panel members.

KEYWORDS: Calcium, Bone Mineralization, White Egg Shell and Brown Egg Shell

Introduction

Due to competition in the market and increased demand for health promoted natural products, attempts are being made to improve cakes nutritional value as well as functionality by modifying their nutritive composition. Eggshell calcium is a good source of dietary calcium and an excellent replacement material for important crustacean shells. The composition of an eggshell is very similar to that of our bones and teeth. It is recommended that people with osteoporosis take 400-500 mg calcium per day to supplement dietary sources. In laying hens in the late production phase, eggshell powder has been found to increase egg production and improve the quality of shells. Hence the present study aimed at the formulation of Cookies with the incorporation of egg shell, Popularize the Nutritional importance of eggshell to the community and to Educate the community on Public Health Nutrition.

Materials and Methods of Study

The good quality white and brown eggs were procured from the local market for the study on the basis of freshness, crack-free, damage resistance, decontamination. The white and brown eggs were selected depending upon the Candling test and Floating tests.

➢ Physical Characteristics of Eggs

Appearance of the egg was assessed based on their colour, shape and cleanliness. The selected eggs were free from cracks, dirt, blood spots. The shape of the egg were "long" half of the prolate spheroid and "short" half of the slightly oblate spheroid which are joined at the equator and shared a principal axis of rotational symmetry. The Normal Weight of the White egg is approximately 50g and the Normal Weight of the Brown egg is approximately 45g.

➢ Quantitative Analysis of Eggshell Powder

The albumin and the egg yolk from the white and brown eggs were removed and the shells were separated. Then the egg shells were wiped with the napkins. The egg shells were exposed to the sun for a day. Then the dried egg shells were crushed using the mortar and pestle.The 50g of crushed egg shell were analyzed for the calcium as Ca and protein content. The calcium and protein were tested by Estimation of calcium content and Kjeldahl method was given in the appendix- II

➢ Incorporation 0f Eggshell Powder

The dried white egg shell were mechanically processed using a mixer mill for 20 minutes as a standard method. Then the white egg shell was sieved and finally the fine white powder was obtained. The dried brown egg shell were mechanically processed using a mixer mill for 20 minutes as a standard method. Then the brown egg shell was

sieved and finally the fine brown powder was obtained.

➢ **Formulation of Cookies**

The Cookies were formulated by incorporating chicken egg shell powder. The both egg shell powder was incorporated in the recipe to replace maida flour at the level of 0.8% in the preparation of Cookies. The baking time of both type of Cookies were about 180˚C for 15 minutes.

➢ **Preparation Of Brown Eggshell Powder Incorporated Cookies**

Table – I Ingredients for The Preparation Of Brown Eggshell Powder Incorporated Cookies

Ingredients	Quantity
Maida flour	117g
Corn flour	25g
Brown eggshell powder	8g
Butter	100g
Powdered sugar	100g
Vanilla essence	0.5g
Baking powder	0.5g

The weighed maida flour, corn flour, powdered sugar, baking powder, brown egg shell powder were sieved and mixed together. Knead the dough by adding butter. Sheet the dough and make it into a desired shape. Greese the pan with butter and arrange the shaped dough in the pan and bake it at 180˚C for fifteen minute

➢ **Organoleptic Evaluation of Prepared Cookies**

The Cookies prepared by incorporating both eggshell powder were evaluated for their sensory characteristics. The score card method was used to determine the sensory characteristics of the formulated Cookies.

Results and Discussion

Quality Analysis 0f Eggs

Candling test revealed that:

There was no crack in the shell, the size of the air cell was observed as AA grade, the firmness of albumin was strong, the position and mobility of yolk was good, absence of foreign substances like blood spots, molds, developing embryo.

✓ **Floating Test**

Table- II

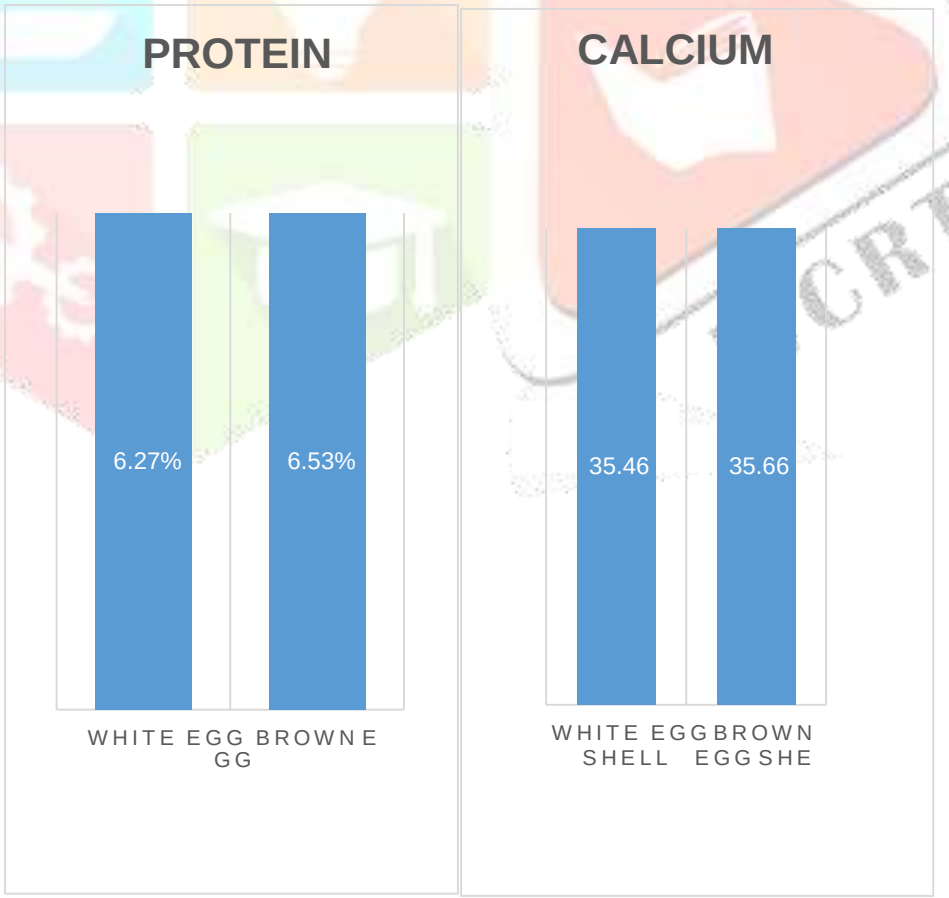
Observation of the Freshness

EXPERIMENT	OBSERVATION	INFERENCE
The white and brown eggs were plunged into the 12% solution of salted water.	The white and brown eggs were settled at the bottom.	Since the freshness is determined.

The above table shows that the quality of the eggs were determined to be fresh since they were settled at the bottom.

FIGURE-I

NUTRITIVE VALUE OF WHITE AND BROWN EGGSHELL POWDER



Nutrient Calculation Of Standard Cookies

TABLE- III

ANALYSIS OF NUTRIENTS IN STANDARD COOKIES

NUTRIENTS	MAIDA (125g)	CORN FLOUR (25g)	POWDERED SUGAR (100g)	BUTTER (100g)	TOTAL
Energy (Kcal)	439.77	90	400	722	**1651.77**
Carbohydrates (g)	92.84	22.1	100	-	**214.94**
Proteins(g)	12.95	0.3	-	0.5	**13.75**
Total fat(g)	0.95	0.05	-	80	**81**
Phosphorous (mg)	137.5	-	-	-	**137.5**
Calcium(mg)	2.55	-	-	-	**2.55**
Zinc(mg)	1.1	-	-	-	**1.1**
Iron(mg)	2.21	-	-	-	**2.21**
Total folates(mcg)	20.31	-	-	-	**20.31**

Nutrient Calculation Of White Eggshell Powder Incorporated Cookies

TABLE-IV

ANALYSIS OF NUTRIENTS IN WHITE EGGSHELL POWDER INCORPORATED COOKIES

NUTRIENTS	MAIDA (117 g)	CORN FLOUR (25 g)	WHITE EGGSHELL POWDER (8 g)	POWDERED SUGAR (100 g)	BUTTER (100 g)	TOTAL
Energy (Kcal)	411.63	90	-	400	722	**1623.6**
Carbohydrates (g)	86.9	22.1	-	100	-	**209**
Proteins(g)	12.12	0.3	10.03	-	0.5	**22.95**
Total fat(g)	0.89	0.05	0.56	-	80	**81.5**
Phosphorous (mg)	128.7	-	64	-	-	**192.7**
Calcium(mg)	2.387	-	56.73	-	-	**59.11**
Zinc(mg)	1.03	-	0.16	-	-	**1.19**
Iron(mg)	2.07	-	3.5	-	-	**5.57**
Total folates(mcg)	19.01	-	-	-	-	**19.01**

Nutrient Calculation of Brown Eggshell Powder Incorporated Cookies

TABLE- V

ANALYSIS OF NUTRIENTS IN BROWN EGGSHELL POWDER INCORPORATED COOKIES

NUTRIENTS	**MAIDA (117 g)**	**CORN FLOUR (25g)**	**BROWN EGGSHELL POWDER (8 g)**	**POWDERED SUGAR (100 g)**	**BUTTER (100g)**	**TOTAL**
Energy (Kcal)	411.63	90	-	400	722	**1623.63**
Carbohydrates (g)	86.9	22.1	-	100	-	**209**
Proteins(g)	12.12	0.3	10.44	-	0.5	**23.66**
Total fat(g)	0.89	0.05	0.128	-	80	**81.06**
Phosphorous (mg)	128.7	-	112	-	-	**240.7**
Calcium(mg)	2.387	-	57.05	-	-	**59.43**
Zinc(mg)	1.03	-	0.16	-	-	**1.19**
Iron(mg)	2.07	-	0.16	-	-	**2.23**
Total folates(mcg)	19.01	-	-	-	-	**19.01**

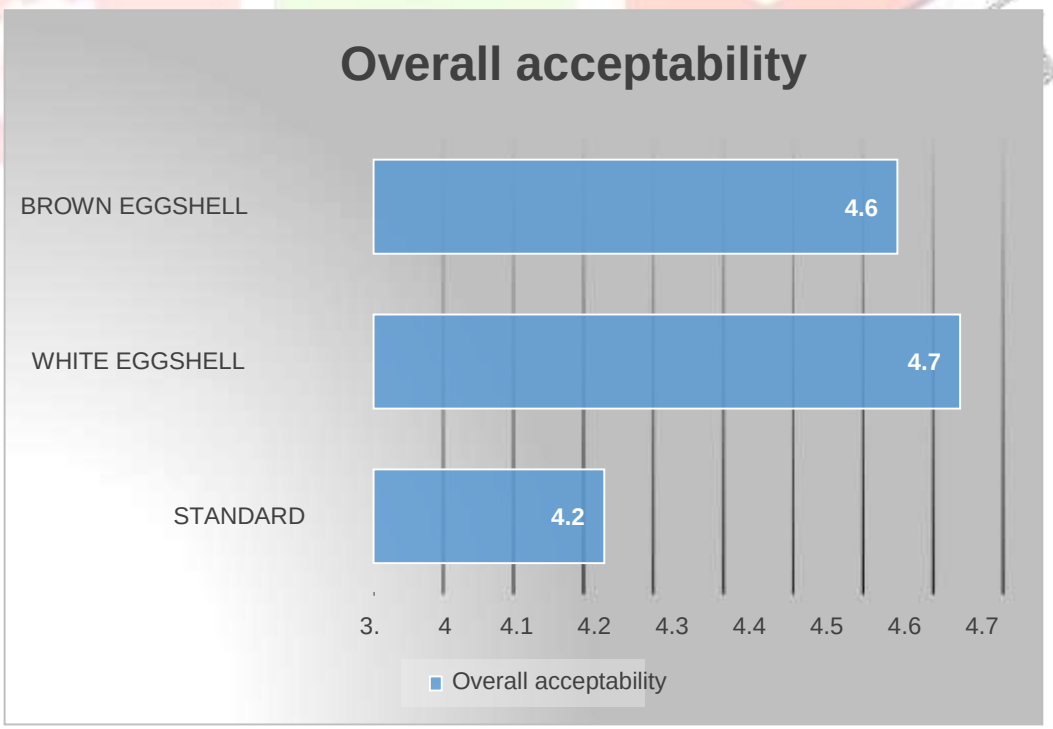
Organoleptic Evaluation of Cookies

TABLE- VI

AVERAGE SCORE FOR STANDARD AND VALUE ADDED COOKIES

CRITERIA	STANDARD COOKIES	WHITE EGGSHELL POWDER COOKIES	BROWN EGGSHELL POWDER COOKIES
Appearance	4.24	4.62	4.62
Colour	4.15	4.66	4.54
Flavor	3.91	4.83	4.70
Taste	4.54	4.79	4.66
Texture	4.34	4.78	4.73
Overall acceptability	4.23	4.74	4.65

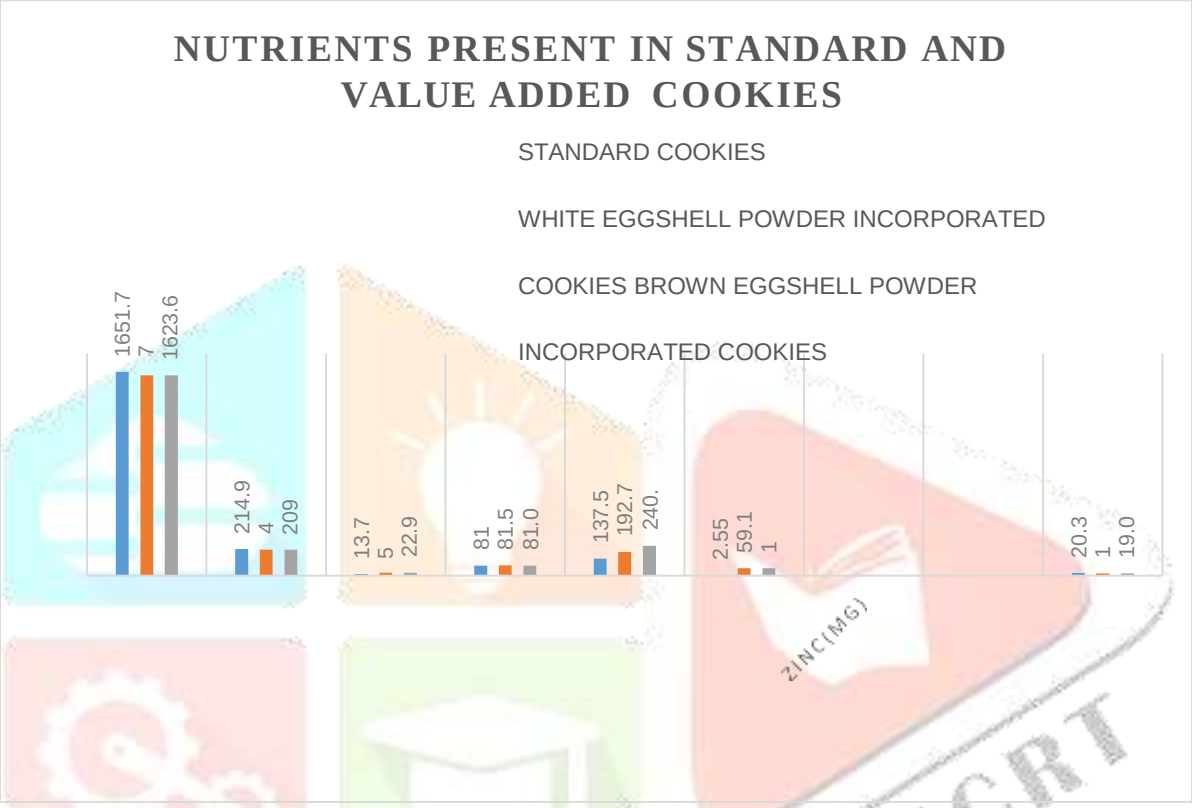
FIGURE-II
OVERALL ACCEPTABILITY OF STANDARD AND VALUE ADDED COOKIES



8g of white eggshell powder was incorporated with 117g Maida for preparing Cookies was highly acceptable by semi trained panel members.

Figure - III

Comparison of Nutrients among the Value Added Cookies



Impact of Popularization and Nutrition Education

The Nutritional awareness about the white eggshell powder and brown eggshell powder and its nutritional composition and health benefits were created among different age groups. The awareness was mainly focused to identify the similarities between the white and brown eggshell powder. From the community survey it was observed that, neither white eggshells nor brown eggshells were non edible and it does not contains any nutritional composition. However our study revealed that white eggshell and brown eggshell contains maximum amount of calcium and protein content. The outer part of the egg (i.e. eggshell) contains more amount of calcium content when compared with the inner part of the egg (i.e. egg yolk and the albumin). Calcium content present in the eggshell was 90% easily absorbable than the other calcium foods. Hence the education created awareness among the public on the white eggshell powder and brown eggshell powder.

Conclusion

The study revealed that, both white and egg shell powder incorporated cookies showed enhanced Nutritive value than the standard cookies. As the calcium requirement is essential for the bone mineralization and plays vital role in health promoting aspects, this study has been underwent to improve the nutritional value of recipies, as well as functionality by modifying their nutritive composition. Nutritional awareness about the white eggshell powder and brown eggshell powder and its nutritional composition and health benefits were created among different age groups. The awareness was mainly focused to identify the similarities between the white and brown eggshell powder. Therefore, the education created awareness among the public on the white eggshell powder and brown eggshell powder.

Bibliography

- Abdullah, M., Nashat, S., Anwar, S., & Abdullah, M. (2017). A framework for crack detection of fresh poultry eggs at visible radiation. Computers and Electronics in Agriculture, 81-95.
- Amu OO, Fajobi AB, Oke BO. Effect of eggshell powder on the stabilization potential of lime on an expansive clay soil. Research Journal Agriculture and Biological Science, 2005; 1:80-84.
- Bee W. 2011 How to make calcium from egg shells. www.healingnaturallybybee.com.
- Bowero J. Food Theory and Applications. 2nd Ed Macmillan,New York, 1992, 36.
- Brinkman, M., Reulen, R.C., Kellen, E., Buntinx, F. and Zeegers, M.P. (2006), "Are men with low selenium levels at increased risk of prostate cancer?" *European Journal of Cancer,* Vol.42, No.15, pp.2463-271.
- Broadus AE. Mineral Balance and Homeostasis In: Favus, MJ. (Ed) Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, 3rd Edition, Lippincott Raven, Philadelphia, 1996, 57-63Brun LR, Lupo M, Delorenzi DA, Di Loreto VE, Rigalli A. Chicken eggshell as suitable calcium source at home. International Journal Food Science and Nutrition, 2013; 64(6):740-3.
- Burke, J.D., Curran-Celentano, J. and Wenzel, A.J. (2005), "Diet and serum carotenoid concentrations affect macular pigment optical density in adults 45 years and older", *Journal of Nutrition*, Vol.135, No.5, pp.1208-14.
- Burley, R.W. and V. Vadehra, 1989. The eggshell and shell membranes: Properties and synthesis. In: The avian egg chemistry and biology, John Wiley, NewYork, pp: 25-64.
- Connelly-Frost, A., Poole, C., Satia, J.A., Kupper, L.L., Millikan, R.C. and Sandler, R.S. (2006), "Selenium, apoptosis, and colorectal adenomas", *Cancer Epidemiology Biomarkers and Prevention,* Vol.15, No.3, pp.486-93.
- Davis AL, PA Curtis, DE Conner. Validation of cooking methods usingshell eggs inoculated with Salmonella semtypes Enteritidis and Heidelberg Poultry Science, 2008; 87:1637-42.
- De Bree, A., van Mierlo, L.A., and Draijer, R. (2007), "Folic acid improves vascular reactivity in humans: a meta-analysis of randomised controlled trials", *American Journal of Clinical Nutrition,* Vol.86, No.3, pp.610-7
- Duntas, L.H. (2006), "The role of selenium in thyroid autoimmunity and cancer", *Thyroid,* Vol.16, No.5, pp.455-60.
- Fernandez, M.L. (2006), "Dietary cholesterol provided by eggs and plasma lipoproteins in healthy populations", *Current Opinion in Clinical Nutrition and Metabolic Care,* Vol.9, No.1, pp.8-12.

- Flores-Mateo, G., Navas-Acien, A., Pastor-Barriuso, R. and Guallar, E. (2006),"Selenium and coronary heart disease: a meta-analysis", *American Journal of Clinical Nutrition*, Vol.84, No.4, pp.762-73

- Food and Agriculture Organization of the United Nations (FAO) (2012) World Egg Day. https://www.fao.org/ag/againfo/home/en/news_archive/2012_World_Egg_D ay_2012.html

- Froning, G.W., 1998. Recent advances in egg product research and development. Presented at the University of California Riverside and Modesto egg. processing workshop. June 2-3, 1998

- Geovana D, Savil T, Bortolott L, Roque S, Tatiana B. Elimination of Salmonella enteric serovar Typhimurium in artificially contaminated eggs through con-ect cooking and frying procedures Ciénc. Tecnol. Aliment, Campinas, 2011; 31(2):492-496

- Goodrow, E.F., Wilson, T.A., Crocker Houde S., Vishwanathan, R, Scollin, P.A., Handelman, G. and Nicolosi, R.J. (2006), "Consumption of one egg per day increases serum lutein and zeaxanthin concentrations in older adults without altering serum lipid and lipoprotein cholesterol concentrations", *The Journal of Nutrition*, Vol.136, No.10, pp.2519-2524.

- Gray, J. and Griffin, B. (2009), "Eggs and dietary cholesterol – dispelling the myth", *Nutrition Bulletin*, Vol.34, pp.66-70

- Guard-Petter J. The chicken, the egg and Salmonella enteritidis. Environmental Microbiology 2001; 3:421-30.

- Hernández-Hernández A Gómez-Morales J Rodríguez-Navarro AB Gautron J Nys Y and García-Ruiz JM 2008. Identification of some active proteins in the process of hen eggshell formation. *Crystal Growth Design.* **8**: 4330-4339.

- Iara, A., A. Odagiu, M. Beniea and L. Clapa, 2007. influence of the mineral supplement eggshell – 49 on production performances and shell quality in hens. Bulletin USAMV-CN, pp: 63-64.

- Rahman MA 2009. *Studies on the mechanism of chalaza formation in quail eggs*. PhD Thesis, United Graduate School of Agricultural Science, Gifu University, Japan. pp: 1-89

- Rahman MA Moriyama A Iwasawa A and Yoshizaki N 2009a. Cuticle formation in quail eggs. *Zool. Sci*. **26(7)**: 496-499

- Rahman MA Moriyama A Iwasawa A and Yoshizaki N 2009b. VMO-II mediates the binding of the chalaziferous layer with the vitelline membrane in quail eggs. *J. Pout. Sci*. **46**: 240-248

- Rahman MA Baoyindeliger Iwasawa A and Yoshizaki N 2007. Mechanism of chalaza formation in quail eggs. *Cell and Tissue Research*. **330**: 535-543

- Schaafsma A, Pakan I, Hofstede F. A Muskiet JE,Van der V, De Vries PJE. Mineral, amino acid and hormonal composition of chicken eggshell powder.

- Wenzel, A.J., Gerweck, C., Barbato, D, Nicolosi, R.J., Handelman, G.J. and Curran- Celentano, J. (2006), "A 12-wk egg intervention increases serum zeaxanthin and macular pigment optical density in women", *The Journal of Nutrition*, Vol.136, No.10, pp.2568-2573

- Woodard AE and Mather FB 1964. The timing of ovulation, movement of the ovum through the oviduct, pigmentation and

shell deposition in Japanese quail (*Coturnix coturnix japonica*). *Poult Sci*. **43**: 1427-1432

- Yamada, Y. (1988) The Contributions of Poultry Science to Society. *World's Poultry Science Journal*, **44**, 172-178. https://dx.doi.org/10.1079/WPS19880017

- Yongcheng L, Michael B, Clive LI, Gary M, Wang K. Eggshell powder compositions and methods of producing eggshell powder compositions Publication number: WO 2013075003 A1, 2013.

- Zaheer, K. (2015), An Updated Review on Chicken Eggs: Production, Consumption, Management Aspects and Nutritional Benefits to Human Health. *Food and Nutrition Sciences*, **6**, 1208-1220 https://dx.doi.org/10.4236/fns.2015.6131