Effect of Quail Egg Administration on Some Liver Function Related Parameters

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Abstract

There are a lot of testimonies on the therapeutic efficacies of quail egg on diabetics and on liver disorders. This study investigated synthetic and conjugatory states of the liver in diabetic rats administered varying concentrations of quail egg solution. Thirty (30) adult male albino Wistar rats were assigned to 5 groups of 6 rats each. Groups 2-5 of rats were injected with alloxan monohydrate intraperitoneally at the dose of 160 mg/kg, while rats in group 1 served as normal control. Upon establishment of fasting blood glucose level above 126 mg/dl, the rats in groups 2-4 were administered 30, 15 and 7.5 mg/ml of quail egg solution respectively for 7 days. Rats in groups 1 and 5 received distilled water (10 ml/kg) each. All treatments were through the oral route. At the end of the 7 days duration of the study, blood samples for serum protein and bilirubin assays were collected.

Results indicated that the quail egg administration to alloxanized rats did not alter total serum protein and albumin values, but improved significantly (p<0.5) the conjugated bilirubin values compared to that of the negative control group (group 5). It was concluded that administration of quail egg solution to alloxanized rats aided hepatic conjugatory ability with little or no effect on its synthetic function.

Keywords: diabetes, liver damage markers, quail egg, Wistar rats

Introduction

Quail egg is a delicacy in many parts of the globe including Europe and North America. In Nigeria, the easterners (Igbos) call the quail egg "Ogazi egg". Quail egg contains several biologically active substances that are required for healthy living. Stadelman (1995) noted that the nutritional value of quail eggs is much more than those offered by other eggs and they are rich sources of antioxidants, minerals and vitamins. Agarwal et al. (2006) equally reported that the quail egg yolks were significantly higher in nutrient in comparison with those of the egg white. According to Dimitrov et al. (2008), the nutritional value of quail egg is 3 to 4 times higher than that of chicken eggs. The most essential fatty acids in quail egg yolk are linoleic acid, docosahexaenoic acid and arachidonic acid (Kostova et al., 1993).

Alloxan has been reported to be toxic to pancreatic beta cells. Researchers have reported that alloxan, through a redox reaction generates free radicals which destroy cells including the pancreatic beta cells (Szukudelski, 2001). It has been reported that antioxidants play vital roles in ameliorating diseases and conditions associated with free radical productions such as diabetes (Kaeler et al., 1993). The negative effects of alloxan monohydrate on various tissues and organs such as liver cannot be overemphasized (El-Dermaidash et al., 2005; Adesokan et al., 2009). The liver is saddled with numerous functions including synthetic (such as protein synthesis) and conjugatory (like bilirubin conjugation). In cases of liver disorder, these functions may be impaired (Murray, 2000).

The objective of this study is to assess the state of the function of liver of diabetic rats given quail egg solution using protein and bilirubin assays as markers.

Materials and Methods

Animals

Adult male albino Wistar rats of 10 to 16 weeks and average weight of 160±15 g were obtained from the animal house of the Faculty of Biological Sciences, University of Nigeria, Nsukka, Enugu state, Nigeria. The animals were acclimatized for the duration of 7 days under standard environmental conditions with a 12 h light/dark cycle maintained on a regular feed (Vital® feed) and water ad libitum. The experimental protocol used in this study was approved by the ethics committee of the University of Nigeria, Nsukka and conforms with the guide to the care and use of animals in research and teaching of University of Nigeria, Enugu state, Nigeria.

Quail egg

Quail eggs used were obtained from the Faculty of Veterinary Medicine, University of Nigeria, Nsukka, Enugu state, Nigeria Farm. The freshly laid eggs weighed between 10-15 g.
Biochemistry determinations were carried out following standard procedures, using Randox test kits (Randox, United Kingdom).

**Determination of serum total and conjugated bilirubin**
Both total and conjugated serum bilirubin were determined following the Jendrassik-Grof method (Doumas et al., 1973) for the *in vitro* determination of direct and total bilirubin in serum using the bilirubin test kit.

**Determination of total proteins**
Total proteins were determined by the direct Biuret method (Tietz, 1975), for the *in vitro* determination of total proteins in serum or plasma using the total proteins test kit.

**Determination of serum albumin**
The serum albumin was determined by the bromocresol green method (Doumas et al., 1971), for the *in vitro* determination of albumin in serum or plasma using the albumin test kit.

**Statistical analyses**
Data obtained were analyzed using One-way Analysis of Variance (ANOVA). Variant means were separated using Duncans multiple range post hoc test. Results were presented as Mean ± Standard Error of the Mean (Mean ± SEM).

**Results**

**Effects of administration of graded concentrations of quail egg on total bilirubin levels of allooxanized rats**

The results indicated that the mean serum total bilirubin levels of all the rats’ groups did not vary significantly at the end of the experiment when compared with the control (Fig. 1).
Conjugated bilirubin values of alloxanized rats treated with varying concentrations of quail egg solution

The serum conjugated bilirubin levels of rats in groups 1 and 2 were significantly (p<0.05) elevated when compared with that of the groups 5 (negative control group), 3 and 4. The values of the conjugated bilirubin of the groups 3 and 4 rats were comparable (Fig. 2).

Effects of administration of varying concentrations of quail egg solution on the serum total protein of alloxanized rats

The results indicate that there was no significant (p>0.05) difference among all the treated groups when compared to the control (Fig. 3).

Effects of quail egg on the serum levels of albumin of alloxanized rats

The results indicate that there was no observed significant difference among all the treated groups when compared to the control (Fig. 4).

Discussion

This study evaluated the effect of administering quail egg to alloxan-induced diabetic rats on hepatic function of such rats by assaying bilirubin and protein values.

There were no observed significant changes in the serum levels of total bilirubin among all the groups across the treatment period. However, the increases in the conjugated bilirubin levels of the treated rats compared to the untreated rats indicate a superior hepatic function in the former compared to the latter. Hepatic processing of bilirubin is achieved by hepatocytes. However, when there is hepatic injury, such function of the liver as bilirubin processing is impaired (Murray, 2000). It is suggested that treatment with quail egg solution may have improved the alloxan-induced liver injury possibly by mopping free radicals which have been incriminated in the alloxan-mediated tissue injuries (Szukudelski, 2001).

The total protein and albumin levels of both treated and untreated rats were statistically comparable. This can only imply that the damage to the liver may not have taken a chronic course as to impair the protein synthetic function of the liver. Researchers have reported that such functions like protein production can be affected in the cases of chronic hepatic impairment (Mezey, 1982). The plasma half-life of plasma proteins is 2-3 weeks.

Conclusions

In conclusion, quail egg administration to the alloxanized rats had no effect on total protein and albumin, but improved the levels of conjugated bilirubin. In general, quail egg administration especially at the concentration of 30 mg/ml improved hepatic conjugator function.

References


