Effect of onion \((\text{Allium cepa} \ \text{Linn.})\) and garlic \((\text{Allium sativum} \ \text{Linn.})\) on plasma triglyceride content in Japanese quail \((\text{Coturnix coturnix japonicum})\)

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Dietary onion and garlic caused an increase in the level of plasma triglyceride which could be due to insulin like activity of dietary alliums and other factors that promote lipogenesis in growing stages. Changes in the plasma triglyceride level in the control group due to change in age and sex were also noted. The triglyceride level was more in female birds when compared to males of similar age group. The plasma triglyceride level increased with age in both sexes except for the level being similar in the 6 and 9-week old females and 3 and 6-week old male birds. The results suggest that the effects of alliums in growing and adult stages may be different which needs further study.

About 30-40 years ago, plasma triglyceride levels were considered to be an indicator for coronary heart disease (CHD) in man. Its predictive ability was then downgraded, but, recent reports highlight again the importance of plasma triglyceride in patients prone for heart disease.

The most practical and least expensive way of overcoming CHD is resorting to non-pharmacological procedures. Onion and garlic have been found to be of medicinal value in mammals including human, especially their usefulness in lowering tissue lipids. Poultry products are comparatively rich in lipid and their consumption has also increased drastically in the recent past. In view of the significance of an increase in plasma triglyceride promoting heart disease and the tendency of change in food habits towards an increase in consumption of poultry products, the present study on the effect of onion, garlic, age and sex on plasma triglyceride in Japanese quail has been undertaken.

Healthy, three-week old Japanese quail \((\text{Coturnix coturnix japonica}; \ \text{210})\) from Kerala Agricultural University Poultry farm were used.

On the first day of the experiment, 30 birds \((15 \text{ of either sex})\) which formed the control group were slaughtered. Blood samples were collected from these birds with heparin as an anticoagulant for assay of plasma triglyceride. Blood samples were centrifuged at 500 g for 10 min and plasma was aspirated into clean dry labeled vials and stored at \(-70^\circ \text{C}\) until analysed.

The remaining 180 birds were divided into 3 groups \((\text{T0}, \ \text{T1} \text{ and} \ \text{T2})\) of 60 each with equal numbers of either sex and as uniformly as possible with respect to body weight. Group T0 was the treatment control group on basal diet, whereas T1 and T2 were the treatment groups on the onion and garlic supplemented diet respectively. All the birds were maintained under standard farm conditions. Birds in all the three groups were reared on grower mash for three weeks and on layer mash thereafter till the end of the experiment \((6 \ \text{weeks})\). Mixing the feed with mashed onion or garlic, each at the rate of one per cent of the total feed was carried out daily before feeding. The feed and water were provided \textit{ad libitum}. The birds were maintained on 18 hrs photoperiod for the first three weeks of the experiment, and 12 hrs photoperiod thereafter.

Chicks \((15 \text{ of either sex})\) were slaughtered at the end of three weeks from each of the three groups \((\text{T0}, \ \text{T1} \text{ and} \ \text{T2})\) and the remaining at the end of the experiment \((6 \ \text{weeks})\) for collection of blood. Blood from all the birds was collected with heparin as anticoagulant and centrifuged at 500g for 10 min. The plasma was aspirated into clean dry labeled vials and stored at \(-70^\circ \text{C}\) until analysed. The plasma triglyceride was estimated as per the standard procedure. The results obtained were analysed statistically by.
following the analysis of variance method\(^5\). The results are presented in Table 1.

A significant increase in the plasma triglyceride content, partly due to growth and partly due to dietary supplementation of onion and garlic was recorded. Various reports have established that onion and garlic cause a decrease in the triglyceride concentration in serum of adult mammals. A decrease in the plasma triglyceride was observed in WLH layers when fed garlic only at the level of 4% in the diet, while no effect was seen when the same was fed at 2% level\(^6\). On the other hand, a decrease in the plasma triglyceride level due to garlic feeding in Hubbard broilers was confirmed to be of questionable biological significance\(^7\).

Onion and garlic feeding has an antibiotic/antibacterial and insulin like effect on the body\(^8\). Insulin causes an increased plasma triglyceride\(^9\). In the chicken also insulin causes an increased secretion of very low density lipoprotein (VLDL) in turn causing an increased plasma triglyceride and phospholipid. There is some sort of metabolic regulation in the grown up chicken preventing true obesity\(^9\). In view of these situations a possibility of increased insulin like effect and also the lack of metabolic regulation preventing obesity in growing birds could be the cause for increased plasma triglyceride observed in the present study. Garlic treatment caused an increased triglyceride in the plasma than onion which probably is because garlic is superior than onion in its alliaceous effect\(^9\). However, the alliaceous effect of garlic and onion was found to be similar in the 9-week old male birds. The increase in plasma triglyceride level due to feeding of onion or garlic could also be due to decreased lipoprotein lipase (LPL) concentration in the peripheral circulation or due to increase in absorptive capacity of dietary nutrients indicating probiotic like effect of onion and garlic\(^9\).

Further, comparison of the values of plasma triglyceride level for the effect of age within a sex or that for sex within an age group indicates that duration of feeding and sex in T1 and T2 groups does not influence the effect of onion or garlic on plasma triglyceride level.

In the control group, the plasma triglyceride level was significantly high in the 6 and 9-week old female birds compared to the 3-week old female birds. No significant difference was observed between the 6 and 9-week old female birds. The reason for low level of triglyceride in the plasma of 3-week old female birds in the present study could be due to poor lipid digestion in the young birds\(^11\). The increase in the plasma triglyceride level in the 6-week old female is due to the influence of oestrogen\(^12\). The plasma triglyceride level was found to be similar in the 6 and 9-week old female birds which probably is due to lower tissue activity of LPL in the 9-week old laying birds that is accounting for accumulation of triglycerides in the laying quail plasma.

In the control group, an increase in triglyceride level was observed in the plasma of the 9-week old male birds compared to 3 and 6-week old male birds, which could be either due to decreased utilization of the triglyceride which is synthesized in liver by peripheral tissues or due to lack of metabolic regulation that prevents onset of true obesity in adult birds\(^9\).

In the control group, the concentration of the triglyceride in the plasma being similar in both male and female birds of 3 weeks age indicates negligible influence of sex hormone at this age. The observation of an increased triglyceride content in the plasma of the 6 and 9-week old female birds compared to male birds of similar age is supported by earlier findings\(^12\)-\(^15\).

In conclusion, onion and garlic has been found to be hypertriglyceridemic in growing Japanese quail probably indicating the effect of alliums in growing
and adult stages to be different and hence warranting a detailed study on this subject. The plasma triglyceride was also found to vary due to age and sex in birds.

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References