

## EFFECT OF AGE AND SEX ON THE BLOOD SUGAR PROFILE IN JAPANESE QUAIL (*Coturnix coturnix japonica*)

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Avian carbohydrate metabolism differs in several respects from that of mammals, some of which include the bird's relative insensitivity towards high doses of insulin and the ability of birds to maintain their blood glucose, at a higher level, where the value is normally almost double than that in most mammals, even during prolonged starvation. Even though, informations are available on the blood glucose level of various species of birds, data on blood glucose level of Japanese quail are meagre. However, a few studies concerning with the blood glucose level of Japanese quail were recorded by Shibata and Watanabe (1981) and Poyraz (1988). The present study was performed in order to investigate the influence of age and sex on the blood glucose level of Japanese quail.

### Materials and methods

The experiment was conducted in 360 Japanese quails of the same strain (egg type) and hatch procured from the Kerala Agricultural University Poultry Farm, Mannuthy. In the first phase of study blood glucose level was estimated in 40, day old quail chicks. Twenty pooled samples were taken for the estimation of glucose

content in blood. The remaining 320 birds were provided with the quail chick ration (Panda, 1990) upto the age of six weeks. At the fourth week of age the quails were sexed and grouped into G1 (males) and G2 (Females) groups. From sixth to sixteenth week of age the birds were provided with quail layer ration (Panda, 1990 and Philomina, 1994). Twenty each of the male (G1 group) and female (G2 group) birds were sacrificed at fortnightly intervals from day of hatch to 16 weeks experimental period. Blood was collected using sodium fluoride as the anticoagulant (10 mg/ml of blood) and the concentration of blood glucose was estimated by the method of Hyravinen and Nikila (1962). Statistical analysis of the data was carried out as outlined by Snedecor and Cochran (1967).

### Results and discussion

The mean blood glucose level of Japanese quails on the day of hatch was  $244.425 \pm 2.204$  mg/dl, a higher value than the value reported by Shibata and Watanabe (1981). From the data recorded vide Table 1

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**Table 1 Mean blood glucose level of Japanese quails at different ages (fortnightly intervals)**

Age in weeks	Blood glucose level in mg/dl (Mean 6 S. E.)		
	Males <sup>1</sup> G1	Females <sup>2</sup> G2	Pooled <sup>3</sup> (Males & Females)
0	244.425 ± 2.204 (unsexed)		
2	228.548 ± 7.241	241.308 ± 7.221	234.928 ± 0.219
4	218.372 ± 5.613	202.619 ± 3.575	210.496 ± 0.150
6	165.534 ± 7.959	206.959 ± 6.513	186.247 ± 0.191
8	168.934 ± 3.544	181.009 ± 5.326	174.972 ± 0.354
10	189.297 ± 7.032	176.444 ± 4.678	182.871 ± 0.148
12	161.826 ± 3.734	176.833 ± 4.120	169.330 ± 0.243
14	184.264 ± 3.023	193.250 ± 9.184	188.757 ± 0.643
16	151.851 ± 5.992	173.217 ± 6.996	162.534 ± 0.246

1&amp;2 Values of 20 birds,

3 Values of 40 birds

(blood glucose level of quails from the day of hatch to sixteen weeks of age of both sexes), it was observed that the blood glucose level was maintained above 200 mg/dl upto an age of

fourth week in the case of males and sixth week in the case of females, where after there was a lowering tendency for the blood glucose level in both sexes (Tables 2, 3 and Fig). With the

**Table 2 Comparison of blood glucose level of male quails between age groups at fortnightly intervals from day of hatch to sixteen weeks**

Weeks	0 V <sub>s</sub> 2	2 V <sub>s</sub> 4	4 V <sub>s</sub> 6	6 V <sub>s</sub> 8	8 V <sub>s</sub> 10	10 V <sub>s</sub> 12	12 V <sub>s</sub> 14	14 V <sub>s</sub> 16
t value	2.0715*	1.1012	5.4250**	0.3902	2.5859*	3.4503**	4.6709**	4.8297**

\* P &lt; 0.05

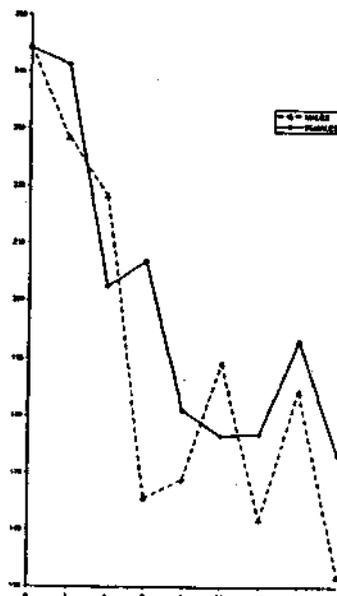
\*\* P &lt; 0.01

**Table 3 Comparison of blood glucose level of female quails between age groups at fortnightly intervals from day of hatch to sixteen weeks**

Weeks	0 V <sub>s</sub> 2	2 V <sub>s</sub> 4	4 V <sub>s</sub> 6	6 V <sub>s</sub> 8	8 V <sub>s</sub> 10	10 V <sub>s</sub> 12	12 V <sub>s</sub> 14	14 V <sub>s</sub> 16
t value	0.4128	4.8014**	0.5842	3.0854**	0.6439	0.0623	2.4424*	2.4427*

\* P &lt; 0.05

\*\* p &lt; 0.01



**Fig. Blood Glucose level of Japanese Quail (0 to 16 weeks period)**

advancement of age the blood glucose concentration of both sexes of quails, showed a decreasing tendency. Young quails had a lower erythrocyte count than their adults (Kundu *et al.*, 1993). The glucose content in the red blood cell was very low. As the number of erythrocytes increased with the advancement of age the glucose concentration in whole blood also got decreased. Blood glucose level estimated in this study was in the whole blood. The increase in

red blood cell count (Kundu *et al.*, 1993) may be the reason for the decreasing tendency of glucose level in the whole blood with the advancement of age.

Influence of sex on the blood glucose level was also observed in Japanese quail. Female quails had comparatively a higher blood sugar level than their males at all age levels except for the fourth and tenth week of age (Tables 1 and 4).

**Table 4 Comparison of blood glucose between male and female Japanese quails at fortnightly intervals from day of hatch to sixteen weeks**

	Age in weeks							
	2	4	6	8	10	12	14	16
Blood Glucose	1.2392	2.3671**	4.0279**	1.8875	1.5217	2.6990*	1.7742	2.3196*

\*  $P < 0.05$

\*\*  $P \leq 0.01$

Higher blood glucose level in female quails was also reported by Poyraz (1988). Male birds had a higher erythrocyte count under the influence of the testosterone (Greenman and Zarrow, 1961) which may be the reason for their lower blood glucose concentration when compared with females.

### Summary

The experiment was conducted to study the influence of age and sex on the blood glucose level of Japanese quails from day of hatch to 16 weeks of age. The study was performed in 360 Japanese quails of the same strain and hatch. In the first phase of study blood glucose was

estimated in 40, day old quail chicks. There after the estimations were conducted in twenty each of the male and female birds at fortnightly intervals. The highest concentration of blood glucose in Japanese quail was recorded on the day of hatch. A decreasing tendency for the blood sugar level of quails was noticed with the advancement of age. Female quails exhibited a higher blood glucose level than their males.

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#### References

- Greenman, D.L. and Zarrow, M.X. (1961). Steroids and carbohydrate metabolism in the domestic bird. *Proc. Soc. Exp. Biol. Med.* **106(3)**: 459-462
- Hyravinen, A. and Nikila, E.A. (1962). Cited by Henry, R.J., Cannon, D.C. and Winkelman, J.W. (1974). *Clinical Chemistry: Principles and Technics*, 2<sup>nd</sup> Ed. Harper and row publishers, Maryland. pp.1285-1289
- Kundu, A.K., Misra, C.S. and Misra, M.S. (1993). Haematological study of different age groups of Japanese quail. *Indian Vet. J.* **70(5)**: 417-421
- Panda, B. (1990). A decade of research and development of quails (1979-1989). ICAR, Central Avian Research Institute, Izatnagar, U.P.
- Philomina, P.T. (1994). The structure and function of the shell gland in Japanese quail under different levels of dietary calcium. *Ph.D. thesis* submitted to Kerala Agricultural University
- Poyraz, O. (1998). Study of plasma glucose, cholesterol and protein values in chickens, quail and their by birds. *Poult. Abstr.* **17(10)**: 351
- Shibata, T. and Watanabe, S. (1981). Change of blood sugar level with growth in Japanese quail and its components. *Jap. J. Zootech. Sci.* **52(12)**: 869-873
- Snedecor, G.W. and Cochran, W.G. (1967). *Statistical Methods*. 6<sup>th</sup> Ed. Oxford and IBH Publishing Company, Calcutta