

Effect of Cobalt Chloride on Lipid Profiles in the Mid Gut of Silkworm *Bombyx mori* L.

K.Sailaja and D.Bharathi
Department of Sericulture, Sri Padmavati Mahila Visvavidyalayam,
Tirupati-517502, Andhra Pradesh, India
Email: dbbharathi@yahoo.co.in

Abstract— The administration of cobalt chloride on the lipid profiles was investigated in the mid gut of the control and cobalt chloride treated fifth instar larvae of silkworm, *Bombyx mori* L. The increase in the total lipids, phospholipids, free fatty acids, triglycerides and glycerol may be due to enhanced biosynthetic activity of mid gut. The decrease in the lipase activity in mid gut indicates the decreased lipolytic activity. The enhanced lipid profiles of the mid gut

Index Terms— *Bombyx mori* L., Cobalt chloride, Total lipids, Phospholipids, Free fatty acids, Triglycerides, Glycerol, Lipase activity.

1 INTRODUCTION

Cobalt exerts favourable effect on the growth of Silkworm (Takahashi, 1956). Lipids form an important metabolic reserve in insects (Kerkut and Gilbert, 1988). It has been reported that the lipid profile influences the nature and amount of dietary carbohydrates (Moore, 1980). Administration of plant growth regulator, IAA on the lipid profiles of Silkworm, *Bombyx mori* L. has been studied (Bharathi and Lakshmikantham, 2012).

2. MATERIAL AND METHODS

The polyvoltine pure breed of silkworm, *Bombyx mori* L. of the race, Pure Mysore was used in the present study.

2.1 Cobalt chloride treatment

For feeding of treated larvae, the fresh mulberry leaves were dipped at least for one hour in cobalt chloride (COCL_2 , Ranbaxy, India) solution having a concentration of 500 $\mu\text{g/ml}/10\text{g}$ of leaf and fed to silkworm on first day of each instar and fifth instar daily. The control group of larvae was fed with mulberry leaves soaked in physiological saline. The matured fifth instar larvae prior to the day of spinning were collected and dissected in ice-cold insect ringer solution and the mid gut of the larvae were isolated and used in the present experiment.

Estimation of Lipid profiles

The total lipids (Folch et al., 1957), phospholipids (Bieri and Prival, 1965), free fatty acids (Natelson et al., 1948), glycerol

(Burton, 1957) and lipase activity (Bier, 1955) were estimated in the mid gut of silkworm larvae.

3. RESULTS AND DISCUSSION

The data presented in the table showed the changes in the lipid profiles and activity levels of lipase in the mid gut of control and experimental (Cobalt chloride treated) silkworm larvae.

3.1 Total lipids: The increased total lipid content of mid gut in the experimental larvae showed decreased lipolysis of mid gut.

3.2 Phospholipids: The increased phospholipid content in the mid gut of the treated larvae might be due to reduced active transport mechanism in the silkworm larvae.

3.3 Free fatty acids

There is a significant increase in the free fatty acid content in the mid gut of experimental larvae and it may be due to fewer uptakes of fatty acids by haemolymph or by other tissues.

3.4 Triglycerides

The triglyceride content in the mid gut was enhanced over control which might be due to absence of lipid oriented metabolism of mid gut.

3.5 Glycerol: The increase in the glycerol content in mid gut of treated larvae indicates the absence of glycerol mobilization

metabolism in the haemolymph.

Lipase activity: The lipase activity in the mid gut of experimental larvae was significantly decreased which indicates the decreased lipolytic activity.

The enhanced levels of total lipids, phospholipids, free fatty acids, triglycerides and glycerol in the mid gut of treated larvae may be due to enhanced biosynthetic activity of mid gut.

The decreased lipase activity of mid gut of experimental larvae indicates the decreased lipolytic activity.

CONCLUSION

In the present study an attempt has been made on the effect of cobalt chloride on lipid profiles in the mid gut of silkworm larvae. It can be suggested that an overall reduced mobilization of lipid profiles in mid gut can be envisaged.

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S.No	Component	Control	Experimental (Cobalt chloride treated)
1.	Total lipids	398.10 ± 14.72	532.24 ± 25.60 +33.69 P<0.001
2.	Phospholipids	48.26 ± 3.78	61.34 ± 4.98 +27.10 P<0.001
3.	Free fatty acids	29.58 ± 2.55	41.73 ± 3.61 +41.07 P<0.001
4.	Triglycerides	18.41 ± 1.29	26.12 ± 1.54 + 41.88 P<0.001
5.	Glycerol	3.46 ± 0.31	4.13 ± 0.39 + 19.36 P<0.001
6.	Lipase activity	0.42 ± 0.037	0.27 ± 0.023 -35.71 P<0.001