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INFLUENCE OF PROBIOTICS [BACILLUS SUBTILLUS AND LACTOBACILLUS SUBTILLUS] ON THE GROWTH OF FINGERLINGS OF CATLACATLA [HAMILTON]

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ABSTRACT

The effect of a commercially available probiotic product containing Bacillus subtillus and Lactobacillus subtillus, on the growth performance in *CatlaCatla* fingerlings was studied.an experiment was conducted to determine the growth performance of Indian major carp*CatlaCatla* fingerlings for period of 60 days. Two experimental groups of commercial pellet diet incorporated with two types of feed probionts(Bacillussubtillus and lactobacillus subtillus) and two control groups maintained separately for *CatlaCatla*fingerlings.The results evaluated that the *CatlaCatla* fingerlings showed maximum increase in length [29.06-+0.74 mm], weight gain [343.39 mg], FCR [1.02] and SGR [0.89] similar trends were observed highest levels in experimental group than that of control group

KEYWORDS: *Catla Catla*fingerlings, FCR, SGR, Bacillussubtillus, and Lactobacillus subtillus, growth performance and weight gain.

INTRODUCTION

Probiotics are organisms and substances which contribute to intestinal microbial balance (Fuller1989).A live microbial feed supplement which beneficially effect the host animal by improving its intestinal microbial balance. The initial major purpose of using probiotics is to maintain or reestablish between friendly and pathogenic microorganisms that constitute the flora of intestinal skin musle of fish.A successful probiotics is expected to have a few specific properties in order to certify a beneficial effect.Antagonism to pathogens is one such property of a probiotic bacteria one sign of antagonism is that it is producing antimicrobial substances

like organic acids, hydrogen peroxide (Ringo and Gatesoupe,1998) or siderophores (Gram and Mel-Chiorsen 1996) in order to have a benificiel effect in the form of growth promotion or to protect fish against bacterial pathogens.Now a days probiotics are also becoming an important part of the aquaculture practices to obtain high production in aquaculture,probiotics have been used to control disease,enhance non -specific immunity, provide nutrients and enzymatic functions and improve water quality (Schaperclaes et al 1992,and Balcozar et al,2006).

In this present study aims to assess the growth and biochemical parameters of indian major carps *CatlaCatla* fingerlings with two different type of feed probionts (Bacillus subtilus and lactobacillus subtllus).

Were fed with commercial pellet incorporated with different nutritional supplements like probionts This study is useful to determine the suitable ratio of supplementary nutrition for weight gain and survival rate of the *CatlaCatla* fingerlings respectively.

MATERIALS AND METHODS

Fig. 1: The systematic position of *CatlaCatla* (Hamilton, 1822).

Kingdom – Animalia
Phylum – Chordata
Sub-Phylum – Vertebrata
Class – Actinopterygii
Order – Cypriniformes
Family – Cyprinidae
Genus – Gibelion
Species – CatlaCatla

Collection and acclimatation of experimental fishes

CatlaCatla fingerlings were collected from Governament fish farm at Kalyanidam, Tirupati, Andhrapradesh, using cast net and maintained laboratory conditions in Sri venkateswara university, Aquaculture department, usedplastic tubs and acclimated in aerated tap water (temp 30+1c,ph 8.0;Do 7.0+0.3 mg/) with continuousas aeration for 12 days prior to experimentation. During the period, fishes were fed with known amount of rfish feed.

Experimental procedure and Feeding trails

CatlaCatla fingerlings having same size and weight were carefully selected. Rearing and feeding experiments were conducted with two different commercial probionts (Bacillus subtillus and lactobacillus subtillus) and control diet (micropelletized commercial feed).Feeding trails was started at a rate of 2% of the body weight in a feeding regime of four times 8:00am,12:00pm,16:00pm and 20:00pm was conducted for 60 days.The growth parameters weight gain (%), Feed convertion ratio (FCR) and specific growth rate (SGR) were calculated following the method of Aliyu-pakio et. Al(2010). At the end of the experiment,analysis of body homogenate of *CatlaCatla* fingerlings was carried out for protein (lowry et.al; 1951); carbohydrate (carroll et.al.1956) and lipid (Folch et.al;1957).

Growth parameters

The growth parameters of the *CatlaCatla* fingerlings were assessed by taking their body weight at 30 days of interval.The growth performance was assessed using the following formula Net weight gain =Net weight gain was calculated described by Mustafa and Ridzwan(2000).

$$\text{Percentage weight gain} = \frac{\text{Final body weight(g)-Initial body weight (g)}}{\text{Initial weight}} \times 100$$

$$\text{Specific growth rate (SGR)} = \frac{\text{Ln(final weight)-Ln (Initial weight)}}{\text{Experimental periods in days}} \times 100$$

$$\text{Food conversion ratio (FCR)} = \frac{\text{Feedgiven(dry Feeding weight)}}{\text{Body weight gain (wet weight of tissue)}}$$

Survival percentage

Survival percentage was calculated at the end of experiment by counting the number of fishes in each tub and is calculated as follows

$$\text{Survival (\%)} = \frac{\text{Total number of Animal harvested}}{\text{Total number stocked}} \times 100$$

Fig. 2: Experimental setup in indoor laboratory.

RESULTS

Probiotics are non – pathogenic and non –toxic organisms without undesirable side effects when administred to aquatic organisms (Farzanfar, 2006). Results of this study substantiate the fact of the probionts have direct growth promoting effects on catlacatla fingerlings which is an accordance with the reports of Who et al., (1994), Chaudhari and Razi (2007), there are various other benefits of using probionts for fish aquaculture including that of carp such as reduction in culture cost of indian major carps (Ghosh et all, 2003 and Swain et all,1996) studies revealed enhancement of feeding efficiency in acipenser when feed with probionts (Jafaryan and Bagherio 2008), enhanced immunity in catlacatla fingerlings ofter oral administration of probionts Bacillus subtillus and lactobacillus subtillus (Kumar et all, 2008) and enhanced growth performance and feeding efficiency in catlacatla fingerlings (Chaudary and Razi (2007), this is an agreement with the present results where significance enhancement in growth performance and nutrient utilization like FCR and SGR when observed in catlacatla fingerlings fed with probionts. Probiotics are live microbial cells that are administrated to the gastrointestional tract of the host as a feed supplement, improving its intestinal microbial balance health (Fuller, 1989), the addition of probionts reduced culture cost of indian major carps (Swain et all., 1996).

At the end of experimental period both groups received probiotics supplemented diets. The concentration of total proteins, carbohydrate and lipid have been measured in the musle and liver tissue of *" CatlaCatla*" fingerlings fed for 30 days on control and experimental diets on days 1,10,20 and 30 of the rearing period. Results pertaining to the concentration of total protein in the musle of *"CatlaCatla*" fingerlings fed on control and experimental diets are

preseted in figures 1 and 2.The results clearly show that there is significant increases in the protein content of the muscle with increase in rearing time both in control and experimental groups.Obviously within the treated /experimental groups,except in day 1 group.There are significant increase ($p<0.01$) in the total protein content of the muscle in the experimental groups (E1,E2) compared to control (C1,C2) groups.

Show the figures 3 and 4 present results on the concentration of total protein in the liver of" *CatlaCatla*"fingerlings fed on control (C1,C2) and experimental (E1,E2)diets.It is clear from the results that there is a significant increase($P<0.001$) In the total protein content of the liver with increase in rearing time both in control and experimental groups (fig3). Apparently there are significant increased ($P<0.001$) in the total protein content of the liver of *CatlaCatla* fingerlings fed on experimental diets (E1,E2) compared to those fed on control diets (C1,C2) except the first group. Obviously E1 and E2 diets augmented total protein content of the liver by 32% and 34% respectively on day 10;by 32% and 44% respectively on day 30.Compared to the respective C1 and C2 Diets (fig 4). However E2 diet enhanced total protein content of the liver significantly than E1 a day 20 and opposite is true on 30 days.

Shown the results on the concentration of total carbohydrate in the muscle of fingerlings of *CatlaCatla* feed on control and experimental diets are presented in figure 5 and 6 it is evident from the results that there is a significant increase ($p<0.001$) in the total carbohydrate content of the muscle with increase in rearing time from 1 to 30 days both in control and experimental groups (fig 5).Obviously there are significant increases ($p<0.001$) in the total carbohydrate content of the muscle of *CatlaCatla* finger fed on experimental diet (E1,E2) compared to these fed on control diets (C1,C2) on day 10,20 and 30 but not on day 1.Apparently E1 and E2 diets enhanced total carbohydrate content of the muscle significantly by12% and 22% respectively on day 10; by 16% and 23% respectively on day 20 and 17% and 20% respectively on day 30 compared to the respective C1 and C2 diets (fig 6).HoweverE2 diet increased total carbohydrate content of the muscle significantly than E1 on day 10,20 and 3o.

Show the results figure 7 and 8 present results on the total carbohydrate content of the liver of *CatlaCatla* fingerlings fed on control (C1,C2) and experimental (E1,E2) diets.The results clearly show that there is a significant increase ($P<0.001$) in the total carbohydrate content of the liver with increase in rearing time (1 to 30)days both in control and experimental group (fig.7)

Apparently there are significant increase ($p<0.001$) in the total carbohydrate content of the liver of fingerlings fed on E1 and E2 diets compared to those fed on C1 and C2 diets.The results show that E1 and E2 diets caused a significant increase ($P<0.001$)in the total carbohydrate content of the liver by 22% and 33%respectively on day 10; by 24% and 27% respectively on day 20 and by 20% and 24%respectively on day 30 compared to the respective C1 and C2 diets (fig.8). Interestingly E2 diet enhanced the total carbohydrate content of the liver significantly than E1 diet on days 10 and 20 but not on day 30 (fig.8).

Results pertaining to the concentration of total lipid in the muscle of *CatlaCatla* fingerlings fed on control (C1,C2) and experimental (E1,E2) diets are presented in in figures 9&10. It is evident from the results that there is a significant increase ($P<0.001$) in the total lipid content of the muscle with increase in rearing time from 1 to 30 days both in control and experimental groups (fig.9) clearly there are significant increase ($P<0.001$) in the total lipid content of the muscle of fingerlings fed on experimental diets (E1,E2) compared to those fed on control diets (C1,C2) on days 10,20 and 30 but not on day 1.

Obviously E1 and E2 diets enhanced total lipid content of the muscle by 18% and 21% respectively on day 10 by 26% and 29% respectively on day20 and 20% and 24% respectively on day 30 compared to the respective C1 and C2 diets (fig.10).It is further observed that E2 diet increased the total lipid content of the liver significantly than E1 diet on day 20 compared that on day 10 and 30.

Show the results on the concentration of total lipid in the liver fingerlings of *CatlaCatla* fed on control and experimental diets are presented in figures 11 and 12. The results clearly show that there is significant increase ($P<0.001$)in the total lipid content of the liver with increase in rearing time from 1 to30 days both in control and experimental group (fig.11).Evidently there are significant increase ($P<0.001$) in the total lipid content of the liver of fingerlings fed on experimental diets (E!,E2)compared to these fed on control diets (C1,C2) on days 10,20 and 30 but not on day 1.It is clear that E1 and E2 diets enhanced total lipid content of the liver by 22% to 26% respectively on day 10; by 23% and 25% respectively on day 20 and by 28% and 30% respectively on day 30 compared to the respective C1 and C2 diets (fig 12), interestingly no significant difference were observed in the total lipid content of the liver as a function of treatment of fingerlings with E1 and E2 diets on day 10,20 and 30.

DISCUSSION

Fish culture are increasing to compensate for the storage of animal protein all over the world. Protein is the major sourse of energy in fish feeds and it helps primarily in tissue buildup of fishes. It has been reported that the quality of protein feed is highly important for the growth of fingerlings of *Catla Catla* (Singh et al 1979,1980). As a high level protein of animal origin is the choice in the selection of commercial fish feed.

Catla Catla (Botcha) is an ideal species form as culture in fresh water ecosystem. Development of a balanced artificial diet is most essential for successful rearing of *Catla Catla* it has been reported that only those diets which are low in both protein and total energy have resulted in decreased weight gain (Garling and Wilson 1976).The optimum amount of dietary protein and energy therefore, play a key role in the growth of fish.

A recent trends use of feed probionts are live microbial feed suppements which beneficially affect the host animal by improving its intestinal microbial balance (Fuller,1989,1991) the potential benefits include improved nutrition and growth and prevention of various disorders.

On the whole the results of the study clearly demonstrated the positive influence of probiotics with commercial formulated feed on the growth of *CatlaCatla*fingerlings.It is quite evident from the results that the protein content of the muscle and liver of the fingerlings increased with increase in time from 1 to 30 days indicating the positive influence of the probiotics feeds on growth (fig.1 to 11).

However E1 and E2 Diets seem to have a more potentiating effect on the total protein content of the muscle and liver than C1 and C2 diets on day 10, 20 and 30. The fact that E1 and E2 diets have probiotics(Bacillus subtillus and lactobacillus subtilus) as a component could be the reason which probably explains the significant increase in the total protein content of the muscle and lier compared to control diets C1and C2 without probionts.Similar results have been reported in other fresh water fish where use of probiotics diets greatly enhanced the total protein content of the fish.

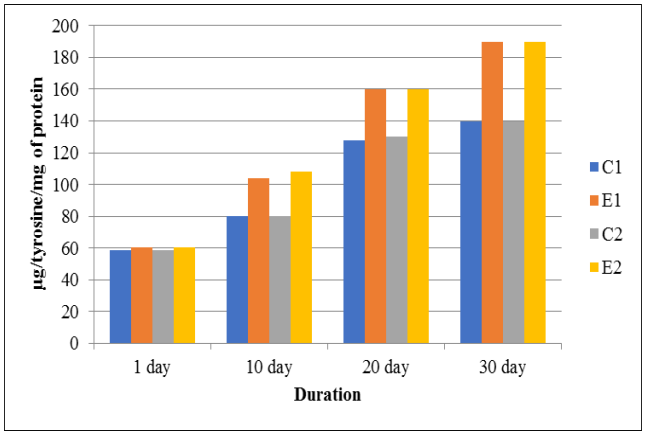

Fig. 1: Furnished the levels of total protein (TP) mg/gm wet weight in muscle tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 day.

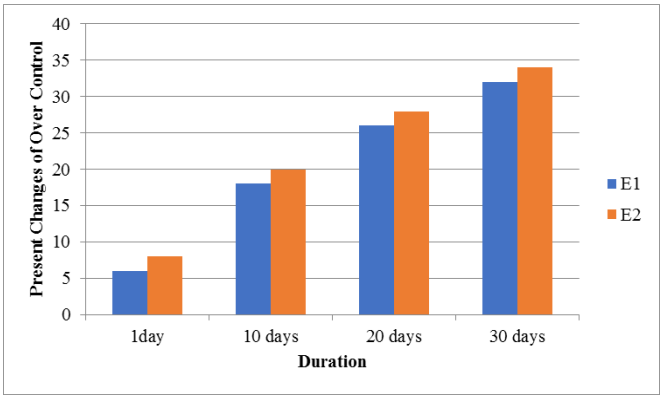

Fig. 2: Percent change in the levels of total protein (TP) mg/gm wet weight in the muscle tissue of fingerlings of *CatlaCatla* fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

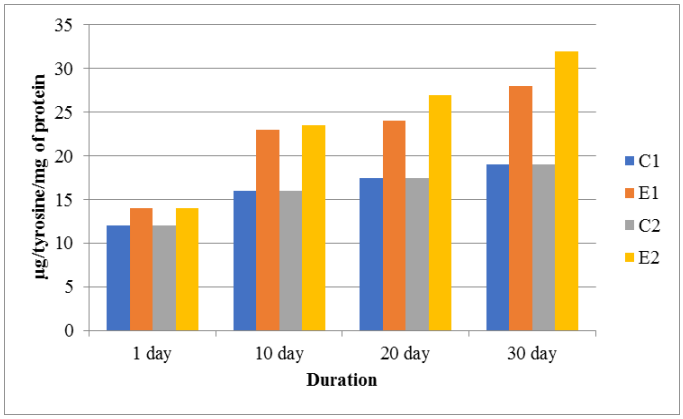

Fig. 3: Changes in the levels of total protein (TP) mg/gm wet weight in liver tissue of fingerlings of *CatlaCatla*with different diets (C1, C2, E1, E2) at the end of 1day, 10 day, 20 day and 30 days.

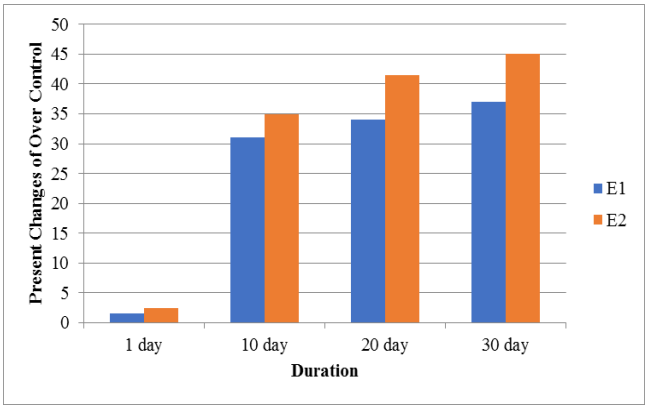

Fig. 4: Percent change in the levels of total protein (TP) mg/gm wet weight in the liver tissue of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

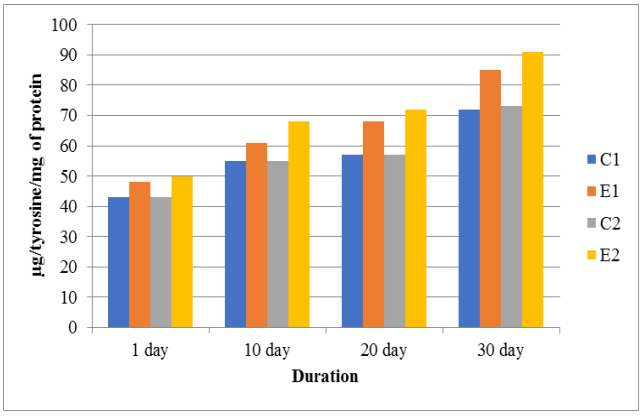

Fig. 5: Changes in the levels of total carbohdrate (TCHO) mg/gm wet weight in muscle tissue of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

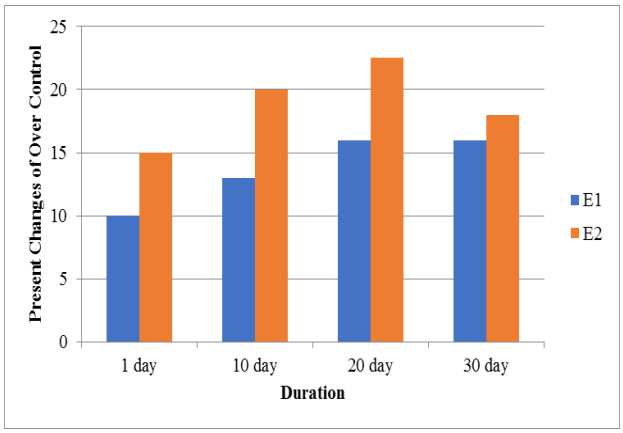

Fig. 6: Percent change in the levels of Total carbohydrate (TCHO) mg/gm wet weight in muscle tissue of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1day, 10 day, 20 day and 30 days.

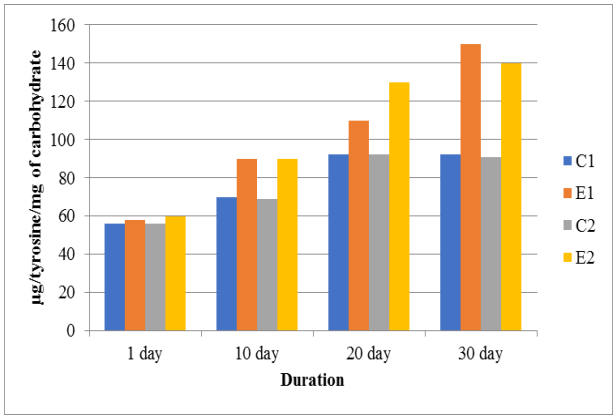

Fig. 7: Changes in the levels of total carbohydrate (TCHO) mg/g wet weight in liver tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

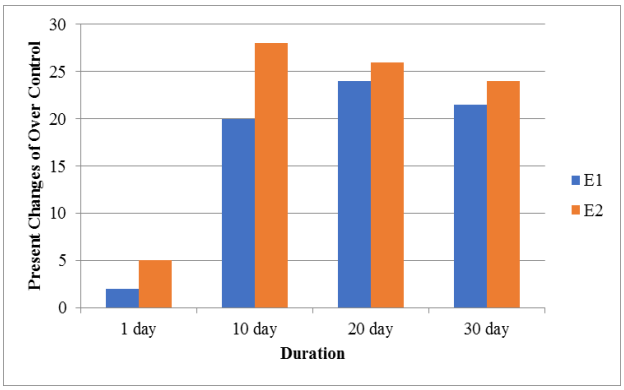

Fig. 8: Percent changes in the levels of total carbohydrate (TCHO) mg/gm wet weight in liver tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 day.

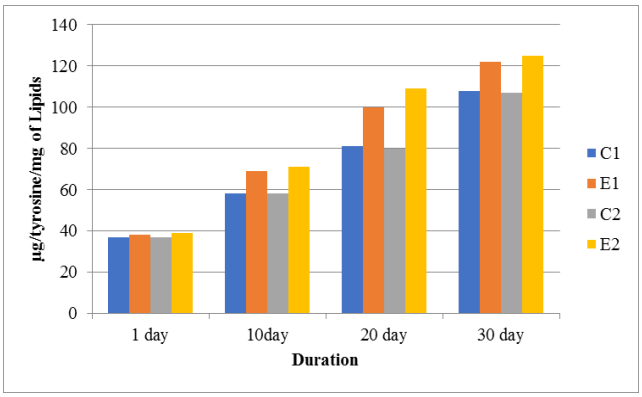

Fig. 9: Changes in the levels of total lipids (TL) mg/gm wet weight in muscle tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

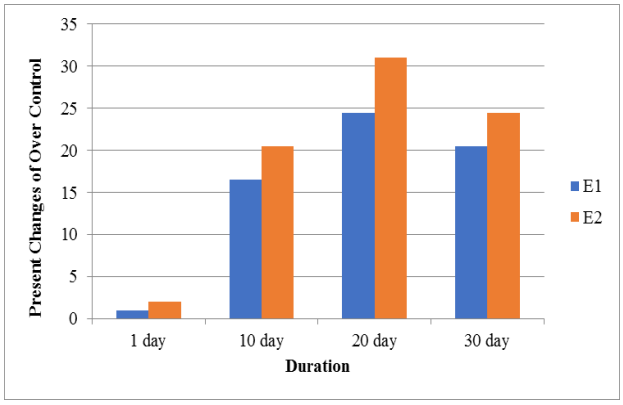

Fig. 10: Percent changes in the levels of total lipids (TL) mg/gm wet weight in liver tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

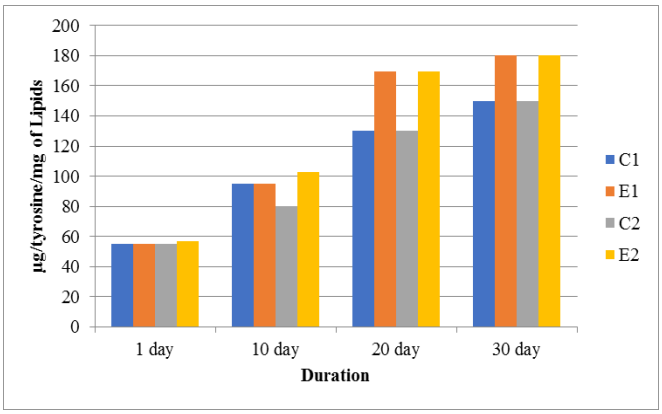

Fig. 11: Changes in the levels of Total lipid (TL) mg/gm wet weight in liver tissues of fingerlings of *CatlaCatla*fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

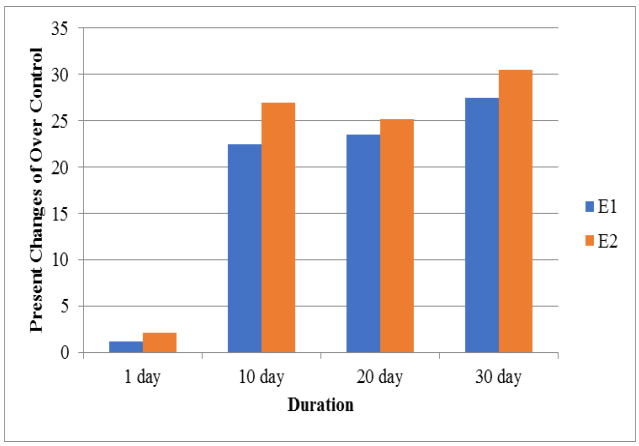

Fig. 12: Percent changes in the levels of total lipids (TL) mg/gm wet weight in liver tissues of fingerlings of fed with different diets (C1, C2, E1, E2) at the end of 1 day, 10 day, 20 day and 30 days.

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