

## Effect of Amino-acid Phenylalanine on the protein content and growth of fish

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### Abstract:

Amino acids are required for maintainance, growth, reproduction and repletion of tissues. A large proportion of the amino acids consumed by the fish are catabolized for energy and fish are well adapted to using excess protein in this way. Amino acids that are not catabolized for energy are available for the use in growth. Three sets of fish *Tilapia mossambicus* were used. one set was starved, one set was fed on fish diet and third set were fed with fish food and injected with phenylalanine. After five days of treatment the fish were sacrificed. Protein, Free amino acids, and DNA, RNA were estimated and effects evaluated.

### Introduction:

Phenylalanine is an essential amino acid, which can be converted to tyrosine within the body which inturn is used to synthesize two important neurotransmitters dopamine and nor epinephrine. D.phenylalanine may help to reduce chronic pain associated with certain health conditions by stimulating nerve pathways in brain that control pain(Walsh et al.,1986)The study has also suggested that D-phenyl may improve rigidity, walking difficulty, speech difficulties and depression associated with Parkinsons disease(Woodward et al.,1993). Evidences suggest that phenylalanine in combination with U V radiation may lead to regimentation of skin in people with vitiligo (Cormacho and Mazuecos,1999; Cormane et al 1985).There are reports that phenylalanine can be used in therapy for depression (Meyers 2000) and improvement of mood (Werbach 1993).On the other hand, people with deficiency of enzyme to metabolize phenylalanine causes a metabolic disorder called phenyl Ketone urea . If not treated within three weeks of age can cause irreversible mental retardation.L-phenylalanine is found in most protein rich foods, the artificial sweetner aspartame is also high in phenyl-alanine(Fugh-Berman and cott,1999)

### Materials and Method:

Mixed sex *Tilapia mossambicus* were obtained from a commercial fish hatchery in Thane. They were placed in aquarium tanks measuring (60+30+30cm) containing dechlorinated tap water. The fish were acclimated/acclimatized to laboratory conditions for a week. Fish were divided into three tanks (10 fish/tank). The first set of fish in tank1 were considered as control and were kept starving for five days. The second set of fish in tank 2 were considered as Experimental 1 and were maintained on commercial diet (Kijaro basic) according to their approximate bodyweight .The third set of fish in tank three were considered as Experimental 2 and were given a dual treatment of commercial diet (Kijaro basic) and injected with a specific amino acid phenylalanine (0.01mg/ml of 0.6%Nacl).The fish in all the three tanks

were treated for five days. The fishes in all the tanks were subjected to the same conditions of photoperiod. At the end of the feeding trial ie on the 6th day the fish were weighed again and then sacrificed. The brain, liver, and the muscles from each set of fish were pooled separately , weighed and extracts were prepared for proteins, Free amino acids, DNA,RNA for estimation and proteins were estimated by the method of Lowry et al., ( 1951). Amino acids were estimated by the ninhydrin reagent method Jayaraman (1981) DNA was estimated by the diphenylamine reagent method (plummer1988)RNA was estimated by the Orcinol reagent –method (Plumme r, 1988)

### Results & Discussion:

The effects of phenylalanine on protein on protein contents, free amino acids content and DNA-RNA content are depicted in Table io A and 10 B

Utilization of dietary proteins by fish depend upon the pattern of essential amino acids, which the dietary proteins provide (Cowey & Sargent 1972)Chance et al 1964) and Klein and Kelper (1970) found that supplying the essential amino acids in dietary protein in excess of optimum requirement of the fish may not necessarily increase its utilization. It is also known that there are interactions between certain of the amino acids so the essential requirement for one amino acid may be influenced by the levels of other amino acids in the test diet. The scrutiny of table10A and 10B show that there is a decrease in protein content following a decrease in the RNA content in all the tissues.

The free amino acids content also decreased in the Experimental 2 set of fish suggesting the imbalance of the phenylalanine content to which the fish were subjected.

Tobias et al; (2002) showed the influence of food quality on RNA:DNA ratio and somatic growth rate of Daphnia. The RNA:DNA has been correlated with somatic growth rate ( $r^2=0.94$ )study of Juvenile cod reared under controlled conditions show that the RNA-DNA ratio in fish changes within a few days of change in feeding conditions. Table 1 &2 shows the RNA/DNA ratio of the brain, liver and muscle tissue of the Experimental1 group of fish. Thus the findings were in accordance with the findings of Larry (1999). Since the fish in Experimental 1 group were maintained on proper diet, The ratio was less in the control group and this could be attributed to the starving conditions to which the fish were subjected. The ratio was the lowest in experimental2 group of fish and this could possibly be because of the interference of phenylalanine that lead to the less intake of food by the fish.

### Conclusion:

Dietary deficiencies in essential amino acids can lead to limitations of growth. A nd when individual amino acid phenylalanine was given it had adverse impact on growth.

**Table I:** Effect of Phenylalanine on the amount of Proteins, Free Amino Acids, DNA and RNA form the brain, Liver and Muscles of *Tilapia mossambica*

TISSUE	PROTEINS (mg/gm)			F.A.A (mg/gm)			DNA (mg/gm)			RNA (mg/gm)		
	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II
Brain	4.26	4.69	3.24	24.2	19.6	20.5	8.65	8.74	8.91	1.32	1.61	1.11
liver	4.48	5.21	3.37	15.7	13.7	11	10.38	11.1	11.2	2.02	2.24	1.84
Muscle	1.75	1.96	1.65	5.51	5.51	5.51	2.12	2.48	2.72	0.18	0.37	0.17

**Table II:** Effect of Phenylalanine on the Percentage Proteins, Free Amino Acids, DNA and RNA form the brain, Liver and Muscles of *Tilapia mossambica*

Tissue	PROTEINS (mg/gm)			F.A.A (mg/gm)			DNA (mg/gm)			RNA (mg/gm)		
	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II	CON	EXP-I	EXP-II
Brain	100%	110%	76%	100%	81%	85%	100%	101%	103%	100%	122%	84%
Liver	100%	116%	75%	100%	87%	70%	100%	107%	108%	100%	111%	91%
Muscle	100%	112%	94%	100%	100%	100%	100%	117%	128%	100%	206%	94%

CON: Control

EXP-I: Experimental-I (Fish Maintained on Standard Diet)

EXP-II: Experimental-II (Fish Maintained With Phenylalanine &amp; Maintained on Standard Diet)

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