Enrichment Effect of Mortierella alpina as a Source of Arachidonic Acid in Rotifer (Brachionus rotundiformis) on Fatty Acids Profile, Growth, Survival Rate and Histophatology of Tiger Grouper Epinephelus fuscoguttatus (Forsskal, 1775) Larvae

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Abstract

Enrichment effects of Mortierella alpina as a source of Arachidonic acid (20:4n-6; ARA) in rotifer Brachionus rotundiformis on development, growth, survival rate, osmotic tolerance test and histopathology was investigated in tiger grouper (Epinephelus fuscoguttatus) larvae. There were 2 feeding trials. Each trial composed of 3 treatments each with 3 replications. In the first trial, rotifer were enriched with 3 different levels of M. alpina as followed; none, 10 and 30 mg M. alpina/l, respectively. In the second trial, rotifer were enriched with 3 different levels of M. alpina as in the first trial but with combination of 100 mg Schizochytrium sp./l as followed; none Schizochytrium sp. and M. alpina, 100 mg Schizochytrium sp./l with 10 mg M. alpina/l and 100 mg Schizochytrium sp./l with 30 mg M. alpina/l, respectively. The tiger grouper larvae in each trial were reared at 2000 larvae/tank and fed once a day for 15 days. At termination of the first trial, there were no significant difference of the larval length among 3 treatments (p>0.05) which were equal to 4.64, 4.45 and 4.58 mm, respectively. However, the significant difference were found in survival rate (p<0.05) which the highest survival rate was obtained from larvae of treatment 1 (8.65%). The second order was the survival rate of larvae from treatment 2 (8.38%). In addition, the survival rate of larvae from treatment 3 was only 6.9% and was significantly lower than that of treatment 1 (p<0.05). It was shown in the second trial that though there were no any significant difference of larval length (p>0.05), weight, development, survival rate and osmotic tolerance test were significantly difference among treatments (p<0.05).
Larval weight of treatment 1, 2 and 3 were 1.91, 3.00 and 3.96 mg, respectively. The highest weight was obtained from treatment 3 larvae, while the second order was larvae of treatment 2. The larvae of treatment 3 expressed the poorest weight (p<0.05). Survival rate of tiger grouper larvae of treatment 1, 2 and 3 were 8.3, 25.4 and 7.5%, respectively. The highest survival rate was obtained from treatment 2 larvae (p<0.05). The major fatty acids in tiger grouper larvae were 16:0, 16:1n-7, 18:0, 18:1n-9 and ARA of larvae treatment 1, 2 and 3 were 4.93, 4.18 and 4.25%, respectively. The EPA/ARA ratio increased while n-3/n-6 and DHA/EPA were decreased.

The Cumulative Mortality Index (CMI), which was obtained from osmotic stress test, was highest in larval treatment 1 (877%). CMI of larvae in treatment 2 and 3 were not significant difference (p>0.05) and were equal to 730 and 765%, respectively. After suddenly changed from 30 ppt to 60 ppt, gill histopathology of all treatment were destructured and were differ from that of the control.

It was shown from the results that tiger grouper larvae required both ARA and DHA for the first 15 days. Enrichment of solely M. alpina in rotifer was not fulfilling the requirements for growth and survival rate. Addition of 100 mg Schizochytrium sp./l improved survival rate and growth as well as osmotic tolerance stress test. The enrichment of 10mg M. alpina /l together with 100 mg Schizochytrium sp./lor at ratio of 1:10 by weight was recommend for nursing of tiger grouper during early larval stage.

**Key words:** Essential fatty acid, Archidonic acid, *Mortierella alpina*, *Schizochytrium* sp., Stress tolerance test, *Epinephelus fuscoguttatus*

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