

Anaesthetic Efficacy and Physiological Response of Clove Oil on the Olive Flounder, *Paralichthys olivaceus*, Temminck et Schlegel

Jun Wook Hur^a, In-Seok Park^b and Young Jin Chang^c

^aResearch Institute of Marine Science and Technology, Korea Maritime University, Busan, 606-791 Korea

^bDivision of Marine Environment & Bioscience, Korea Maritime University, Busan 606-791, Korea

^cDepartment of Aquaculture, Pukyong National University, Busan 608-737, Korea

We examined the effect of clove oil on exposure, recovery time and physiological response in olive flounder, *Paralichthys olivaceus* (Temminck et Schlegel). Olive flounder (mean length: 30.0±1.0 cm, mean weight: 245.0±27.1 g) were exposed to concentrations of clove oil ranging from 40 ppm to 280 ppm for exposure and recovery time at three different temperature regimes: 17°C, 21°C and 25°C. In the 160 ppm group, blood was collected from ten fish after anesthesia 0.5, 1, 3, 6 and 24 hours at 21°C, respectively. After anesthesia, the concentrations of hematocrit, hemoglobin, red blood cell, cortisol, glucose, lactic acid, osmolality, Na⁺, K⁺, Cl⁻, Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) were determined.

Anaesthetic dose and temperature-dependent relationship in exposure and recovery time were observed. According to rise and increase of water temperature and dose, anaesthetic clove oil showed rapid exposure time and slow recovery time. Control and experimental group displayed significant increases in plasma cortisol concentrations from their respective prestress levels at 0.5 hour after anaesthetic ($P < 0.05$) (Figure). Concentrations of glucose were increased from 22.3 ng/mL to 28.5 ng/mL (0.5 hour), 31.0 ng/mL (1 hour) in experimental group, respectively. Lactic acid concentrations for experimental group were lower than those for control group at 0.5, 1 and 3 hours. In other items, control and experimental group did not show significant differences in this before and after anaesthetic. The results indicate that clove oil can be used as suitable anaesthetic for the olive flounder. Our results support previous

findings that clove oil is a reasonable alternative to other anaesthetic.

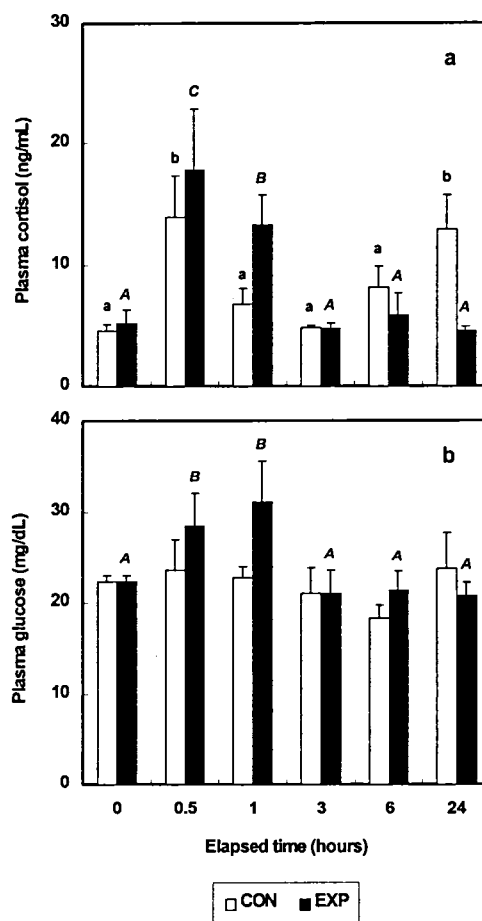


Figure. Comparison of plasma cortisol (a) and glucose (b) in olive flounder, *Paralichthys olivaceus* (Temminck et Schlegel) after anaesthetic. The values are mean±SD ($n=10$). Same alphabetic letters on the same colored bars are not significantly different ($P>0.05$). CON: control group, EXP: Experimental group.

Cooke, S.J., C.D. Suski, K.G. Ostrand, B.L. Tufts, D.H. Wahl. 2004. Behavioral and physiological assessment of low concentrations of clove oil anaesthetic for handling and transporting largemouth bass (*Micropterus salmoides*). *Aquaculture*, **239**: 509-529.

Small, B.C. 2003. Anesthetic efficacy of metomidate and comparison of plasma cortisol responses to tricaine methanesulfonate, quinaldine and clove oil anesthetized channel catfish *Ictalurus punctatus*. *Aquaculture*, **218**: 177-185.

*Corresponding author: hurjw@bada.hhu.ac.kr