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Interactive effect of dietary vitamin C and acute hyperoxia condition on lipid peroxidation, antioxidant activity and hepatic antioxidant gene mRNA expression in Largemouth bass

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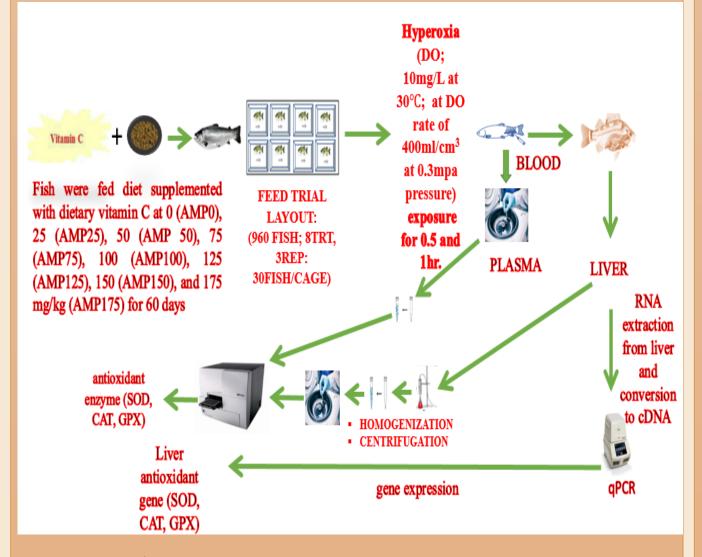
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INTRODUCTION

- Dietary vitamin c can be categorized as a biochemical antioxidant and as an enzyme co-substrate (Akbari et al, 2016)
- a powerful antioxidant which protects low density lipoproteins from oxidation, reduces harmful oxidants in aquatic organism
- Dissolved oxygen (DO) is crucial for the metabolism and survival of fish (Zeng et al., 2016).
- Hyperoxia condition could occur in shallow waters which could influence hemostasis in fish.
- The study was aimed at investigating the interactive effects of dietary vitamin c and constant hyperoxia condition on antioxidant enzyme in largemouth bass.

MATERIALS AND METHODS

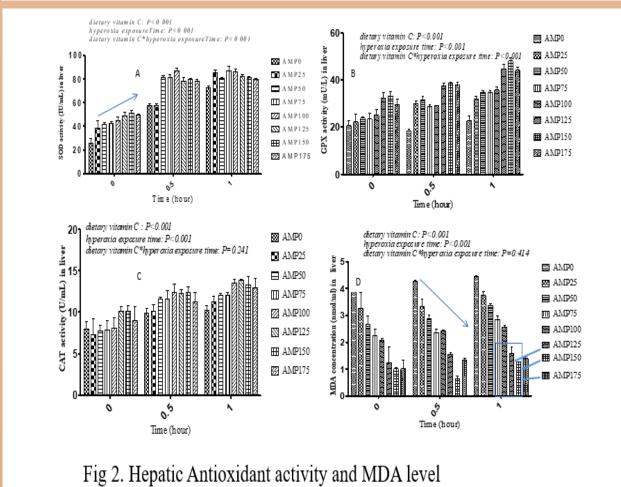


Data analysis

Data obtained were subjected to two-way ANOVA, where significant treatment means were separated with Tukey's test using IBM SPSS Statistics; version 24.0 and graph pad prism version 5.

RESULTS AND DISCUSSION dietary vitamin C: P < 0.001 dietary vitamin C: P < 0.001 hyperoxia exposure time: P<0.001 hyperoxia exposure time: P<0.001 dietary vitamin C*hyperoxia exposure time: P<0.001 ₩ AMP0 AMP25 ■ AMP50 AMP75 ■ AMP150 MR AM P175 Time (hour) Tim e (hour) dietary vitamin C : P<0.001 peroxia exposure time: P<0.001 ₩ AMP0 hyperoxia exposure time: P<0.001 etary vitamin C *hyperoxia exposure time: P<0.001 AMP25 dietary vitamin C *hyperoxia exposure time: P < 0.001 ☐ AMP50 ■ AMP50 AMP75 AMP100 AMP100 AMP125 **AM P175**

Fig 1. Plasma Antioxidant activity and MDA level



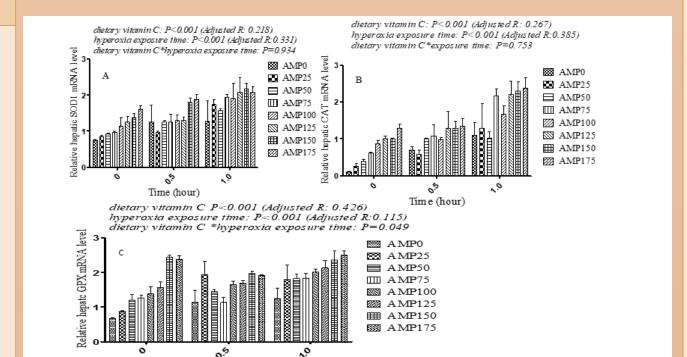


Fig 3. Hepatic antioxidant mRNA gene expression levels

- Dietary vitamin C significantly elevated the plasma and liver antioxidant activity.
- Juveniles fed basal diet showed lowest plasma and liver antioxidant pool
- All antioxidant (SOD, GPx and CAT) activity were elevated by water oxygen saturation level at 0.5 and 1h exposure time,
- MDA concentration were significantly (*P*<0.05) lowered as dietary vitamin C level increased and MDA levels were maintained in juvenile largemouth bass AMP125 to AMP175 group after exposed to hyperoxia condition, but MDA increased in AMP0 group.
- Dabrowski et al. (2004) indicated that the fish under hyperoxic conditions were in some oxidative stress. The oxidative stress under hyperoxic conditions may be attributed to an increased level of reactive oxygen species (ROS).

CONCLUSION

Dietary vitamin C and acute hyperoxia condition actuates antioxidant defense in juvenile largemouth bass.

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Dabrowski K, Lee JK. Guz L, Verlhac V, Gabaudan J. (2004). Effects of dietary ascorbic acid on oxygen stress (hypoxia or hyperoxia), growth and tissue vitamin concentrations in juvenile rainbow trout (Oncorhynchus mykiss) Aquaculture, 233: 383 – 392.

Zeng L, Wang Y H, Ai C X, Zheng J L. Wu X W, Cai R (2016) Effects ofβ-glucan on ROS production and energy metabolism in yellow croaker (*Pseudosciaena crocea*) under acute hypoxic stress. Fish Physiol. Biochem, 42 (5): 1395–1405.https://doi.org/10.1007/s10695-016-0227-1







Tim e (hour)

