

Ara tırma Makalesi
Research Article

**Blood Picture and Enzymatic Activities in Common Crap
Cyprinus carpio Influenced by Sodium Chloride (NaCl)**

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Abstract

The aim of this study was to assess the effect of Sodium Chloride NaCl on blood picture as hemoglobin (Hb), packed cell volume (PCV) and lymphocyte count also the activity of both enzymes Alanine Amino Transferase (ALT) and Creatine Phospho Kinase (CPK) in *Cyprinus carpio*. NaCl was used at different concentration (0.5; 1.0 and 1.5 mg/L) for 7 day. The concentration 1.5 mg/L was toxic to the fish and caused death after 48 hour of exposure, while in the fish that were exposure separately to both concentration (0.5 and 1.0 mg/L) for 7 day there were no any significant differences in blood picture and activity of both enzyme ALT and CPK in these groups and control group. So the NaCl may be toxic in high concentration but safety if it was used in low concentration.

Keywords:

Özet

Sodyum Klorüre Maruz Bırakılan Sazan Balı nda (*Cyprinus carpio*) Kan Profili ve Enzim Aktiviteleri

Bu çalı manın amacı, *Cyprinus carpio*'da Sodyum Klorürün (NaCl) hemoglobin (Hb), hematokrit (PCV), lenfosit sayısı ve aynı zamanda Alanin aminotransferaz (ALT) ve Kreatin Fosfokinaz (CPK) enzim aktivitelerine etkilerini de erlendirmektir. NaCl 7 gün farklı konsantrasyonda kullanıldı (0.5, 1.0 ve 1.5 mg/L). 1.5 mg/L NaCl konsantrasyonu balıklar için zehirli oldu u ve maruz kalmadan 48 saat sonra ölüme neden oldu u görülmü tür. Balıklar ayrı ayrı 7 gün her iki NaCl konsantrasyonuna (0.5 ve 1.0 mg/L) maruz bırakıldı nda bu gruplar ve kontrol grubu arasında kan profili ve her iki enzim ALT ve CPK aktivitesinde herhangi bir önemli fark görülmedi. NaCl yüksek konsantrasyonda toksik olabilir. Fakat dü ük konsantrasyonda güvenle kullanılabilir.

Anahtar Kelimeler: Hb, PCV, ALT, CPK, NaCl, sazan balı ı.

Introduction

Sodium Chloride (NaCl) was important structure was used in aquaculture as antibacterial, antifungal and used for controlling parasite disease, it was at concentration 3-5% for 1-2 min and 1.0-1.5% for 20-30 min (Post,

1987). NaCl considered as stress-reduce substances (Weirich et. al., 1992). Andrews et. al. (2002) reported that the NaCl at concentration 0.3% has ability to reduce the stress related to high level of nitrate, NaCl at concentration

1.0 g/l was cause decline in the toxicity of cadmium chloride in *Cyprinus carpio* (Al-Tae, 2008). In general revealed that the salt at concentration more than 1% may be considered stressful factors in fish (Andrews et. al., 2002). In other hands the salt define as one of the environmental pollution, if it is concentration was elevated than normal levels (Williams, 1987).

Freshwater fish was stenohaline and suffer from osmotic shock when it was transported to salt water because the negative effects of NaCl. Other study showed the effects of NaCl on survival rate of fish, Azzawi et. al. (1999) reported that the mortality rate of *Cyprinus carpio* may be increase when the fish exposure to NaCl, also there was decrease food consumption and decline glycogen storage in liver and muscle of fish (Boeck et. al., 2000).

Fish was very sensitive to the sudden alteration in salinity of water, so the aims of this study were to determined the survival rate of fish through evolution the hematological parameters which were considered as indicator for health managements (Chen et. al., 2004) also study of the blood chemistry parameters give indicator for the physiological stress responses in fish (Lermen et. al., 2004; Koeypudsa et. al., 2006).

Materials and Methods

Acclimatization:

Cyprinus carpio (n=40) weight 125 ± 5 g purchased from Collage of Agriculture and Forestry University of Mosul, fish were acclimated in dechlorinated tap water for at least 7 day in the laboratory before experimental time and fed twice daily, the water temperature was maintained at $25 \pm 2^\circ\text{C}$.

Expermental design:

Fish were distributed randomly in to four

groups one of them considered control group, fish in this group treated with dechlorinated tap water, other groups were treated with NaCl at different concentration (0.5; 1.0 and 1.5) g/l for 7 day. Blood was collected from caudal vein for determined the Hb concentration (Syrbio kit), PCV and lymphocyte count (Coles, 1986), and assess the serum enzyme activity as ALT (Biomaghreb kit) and CPK (Biolab SA kit).

Statistical analysis:

The test C.R.D. was using for statistical analysis and Duncan's Multiples Range test for compared differences between the groups at the (p 0.05).

Results

Behavior responses:

Fish exposure to various concentration of NaCl was showed different physiological and behavior responses. So there was abnormal movement and swimming of fish exposed to 1.5 g/L they were suffered from asphyxia and try to swimming at the surface of water to obtain the oxygen and then all the fish die within 48 hour from the experiment. Fish in other both groups that were exposure to NaCl at concentration (0.5 and 1.0 g/L) for 7day exhibit normal swimming.

Blood picture:

There was no significant different in Hb concentration between the fish exposure to NaCl at both concentration (0.5 and 1.0 g/L) and also between control group. The PCV of fish exposure to NaCl at (0.5 and 1.0 g/L) reached to 41.30% and 41.60% continuously, while the PCV of fish in control group was 45.40% so there was no significant difference between all groups. The results related to lymphocyte count also exhibit no significant difference for all groups Table 1.

Table 1. Effect of NaCl on blood picture

Groups	Hemoglobin (g\dl)	Packed cell volume (%)	Lymphocyte count (%)
Control group	14.64±1.79 ^A	45.40±3.34 ^a	96.60±0.97 ^A
Group treated with NaCl at 0.5 g\L for 7 day	11.36±0.49 ^{Ab}	41.30±2.28 ^a	93.00±2.21 ^{Ab}
Group treated with NaCl at 1 g\L for 7 day	10.96±0.57 ^{Ab}	41.60±2.04 ^a	93.00±1.00 ^{Ab}

Different letters meaning there was significant difference at ($p \leq 0.05$) between the groups.

Table 2. Effect of NaCl on enzymes activities

Groups	ALT activity (IU)	CPK activity (IU)
Control group	5.48±0.70 ^b	5.38±0.91 ^a
Group treated with NaCl at 0.5 g\L	6.54±1.30 ^B	5.10±0.94 ^a
Group treated with NaCl at 1 g\L	4.96±1.05 ^B	4.72±0.67 ^a

Different letters meaning there was significant difference at ($p \leq 0.05$) between the groups.

Enzymes activities:

The results in the Table 2 explained the activity of ALT in the serum of fish in all groups which were reached in control group and groups exposure to (0.5 and 1.0 g\L) to (5.48; 6.54 and 4.96 IU) contentiously, in the same table there were no significant differences in results related to the activity of CPK in all groups.

Discussion:

Stress is the loss of the balance homeostasis which may affect behavior, reproduction, etc. (Chen et. al., 2004; Morales et. al., 2005). Fish exposure to stress as a result of changes in culture system, so this fish may be

responses to stress by develop physiological and biochemical adaptation to minimized the effect of stress and these called stress responses (Koeypudsa and Jongjareanjai, 2011).

In this study the which were exposed to NaCl at 1.5 g\L were dead through 48 hour, this result agreement with (Eddy, 1982) whose reported that the salinity may decrease the survival rate of the fish and this may because the osmotic shock result from sudden changes in the aquatic environmental from fresh water to salt water which lead to increase Na and Chloride ions in plasma and loss the osmoregulatory and this called Adjustment Phase Osmoregulation (Azzawi et. al., 1999; Bath and Eddy, 1979).

The osmoregulative is the phase in which the fish have the ability to adapted to the changing in the plasma ions (Matez, 1971), so the fish in both groups exposure to (0.5 and 1.0 g/L) have the ability to survival in these salt water, this result agreements with Koeypudsa and Jongjareanjai (2011).

The results in our study revealed there were no significant difference in hematological picture and enzymes activity in all groups ad these may due to the increase number of chloride cells in gill which play important role in expelled the ion also increase activity of Na^+/K^+ ATPase (Langdan and Thorpe, 1984). Gomes et. al. (2006), Trumble et. al. (2006), Souza-Bastos and Freire, (2009) were reported that present salt in the water may cause loss ions from fish to environment by decreased the plasma water gradient.

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