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Impacts of Salinity Stress on the Physiology and Tissue Structure of Nile Tilapia

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Abstract

Salinity is considered one of the most important environmental factors, and stress induced by salinity negatively impacts aquaculture production. This study focused on hematological and histological alterations induced by different salinity levels in Nile tilapia (*Oreochromis niloticus*). The experiment was carried out with a total of 300 fingerlings exposed to 5 different treatments: T1 (control), T2 (3 ppt), T3 (6 ppt), T4 (9 ppt), and T5 (12 ppt) with three replicates each, over 42 days. The study revealed that hemato-biochemical parameters (hemoglobin and glucose) levels were increased at 9 and 12 ppt compared to the control. Regarding erythrocytic abnormalities, cellular (fusion, twin, teardrop, spindle) and nuclear (nuclear bridge, binuclei, notched nuclei, karyopyknosis) abnormalities were significantly more abundant in T4 and T5 compared to other treatments. Histological examination showed that the abnormalities of gills (epithelial lifting, hypertrophy of chloride cell, telangiectasia, deformed pillar system, hyperplasia), liver (hepatocyte hypertrophy, hemorrhage, blood congestion, hemosiderin, melano-macrophage centers), kidney (necrosis, shrinkage of renal corpuscle, hemorrhage, glomerular destruction, melano-macrophage centers) were found in 9 ppt, but markedly alterations were detected at 12 ppt with increasing the days of exposure. These findings are projected to be valuable in raising awareness about the importance of salinity levels for freshwater aquaculture species.

Key Words: *Salinity, Stress, Hematology, Histology, Tilapia*