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Impact of decreased pH resulting from CO_2 elevation on survival, growth, and development of *Polypedates cruciger* (Common Hourglass Tree Frog)

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Climate change has a significant impact on biodiversity. Elevation of global mean atmospheric CO_2 levels as a result of climate change results in elevation of pH. Amphibians are a group that is critically vulnerable due to their strong dependence on aquatic habitats and their specialized habitat preference. Therefore, determining the physiological impact of decreased pH resulting from CO_2 elevation on local amphibian species is a timely research requirement. The objective of this study was to determine the physiological impact of early larval exposure to decreased pH in *Polypedates cruciger*. Carbon dioxide was bubbled into treatment tanks (E_{CO2}) to adjust the pH of de-chlorinated water in the range of 5.5-5.6. This pH range in water was selected in line with Representative Concentrations Pathways (RCPs) 8.5 and 2.6. Sodium citrate-citric acid buffer was used to maintain the desired pH range. Control treatment (T_c) with ambient pH was bubbled with air at the same rate as CO_2. Each treatment had three replicate tanks, with 15 tadpoles each. The experiment was carried out from Gosner stage 26 to 42 of tadpoles. Mean percentage cumulative mortality (MPCM) of tadpoles of E_{CO2} gradually increased and reached a maximum (6.6%) after 3^{rd}-4^{th} weeks. MPCM of T_c was zero. The total body length, snout-vent length and tail length of tadpoles of E_{CO2} showed a significantly high rate of increase within the first two weeks of the experiment compared to the T_c. Body width of tadpoles of E_{CO2}, had a rate of increase similar to that of T_c. Rates of increase of all morphometrics showed a gradual reduction, while those of E_{CO2} were lower than those of T_c as tadpoles neared metamorphosis. Tadpoles of E_{CO2} took shorter times for reaching hind-limb and fore-limb emergence stages compared to T_c. Increased MPCM observed in E_{CO2} could have resulted from physiological stress caused by metamorphosis coupled with stress caused by low pH. Higher expenditure of energy for maintaining homeostasis could have yielded lower morphometrics in E_{CO2} at the time it metamorphosed.However, accelerated development of E_{CO2} could have resulted from adaptive plasticity developed by tadpoles to the selected range of low pH.

Keywords: Climate change, metamorphosis, morphometrics, RCPs, mortality.

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