

5 Conclusion

It can be concluded that haematological parameters are reliable and useful indicators of fish health status in response to environmental changes. The present study demonstrated that sub-lethal concentrations of *Senna occidentalis* leaf extract disrupt hematological homeostasis in *Clarias gariepinus*. Significant reductions in RBC, Hb, and PCV with altered MCV indicate hemolytic or hypoxic anemia. These changes are consistent with oxidative injury, impaired erythropoiesis, and cytotoxicity reported for other xenobiotics, indicating that bioactive compounds in *S. occidentalis* exert hematotoxic effects. Therefore, it can be stated that *S. occidentalis* toxicity caused consistent, gradual damage to the immune system of *C. gariepinus*. In relation to the potential risk of using *Senna occidentalis* in aquaculture environments or its relevance for toxicological assessment in fish, these data offer a reference point for assessing fish health and promoting safe application of plant-based extracts in aquaculture.

Author's Contribution

Idowu Adekunle Adedoyin conceived and designed the study, critically reviewed the manuscript, and approved the final version. Adesanya Oluwatosin Emmanuel participated in the hatchery experiment, drafted the manuscript, and contributed to funding support. Towolawi Adeleke Taofik contributed to funding and conducted the haematological analyses together with Adesanya Oluwatosin Emmanuel. Odukoya Abimbola Erastus documented the sub-acute exposure experiment and also contributed to manuscript preparation. Adekola Mukaila B. supervised the overall study, participated in the experimental design and coordination, and assisted in drafting the manuscript. All authors read and approved the final manuscript.

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