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Research Paper

Kidney analysis of *Clarias gariepinus* in relation to weight from Jabi Lake, FCT, Abuja, Nigeria

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ABSTRACT

This research work investigates kidney analysis of *Clarias gariepinus* in Jabi Lake. 20 *Clarias gariepinus* was obtained from Jabi lake ranging between 34.5-49.0 cm and 340-850 g respectively. The fishes were divided into 3 groups with varying lengths and weights; Group 1 contain 8 fishes 34.5-39.5 cm in length and 340-500 g in weight. Group 2 contain 6 fishes 40-39.7 cm in length and 350-500 g in weight while Group 3 contains 6 fishes 43.0-49.0 cm in length and 550-850 g in weight. At the end of data gathering and analysis, result indicated that using level of significance ($p<0.05$), Urea was significant to weight in all the groups. While there was a significant decrease ($p<0.05$) in the urea and creatinine levels of catfish in group 3 recording 0.35 mg/dl as the lowest in creatinine and 2.04 mg/dl in Urea. Maximum level of Urea and creatinine was recorded as 28.8mg/dl and 1.91 mg/dl were obtained from catfish in group 2 and 3 respectively. The electrolyte, concentration of Na, K and Cl in the kidney of the experimental fish in pond one were all within the normal range limits. While Na, K and Cl at both pond 2 and 3 were all above normal range limits. This study concluded that weight has an effect on the creatinine level of *Clarias gariepinus* and electrolyte level in *Clarias gariepinus* is subjected to pollution in their habitat.

Key word: *Clarias gariepinus,* kidney analysis, Urea and creatinine levels

INTRODUCTION

African cat fish (*Clarias gariepinus)* of the family *claridae* is the most common Nigerian fresh water fish species because they are easily cultured with large economic gains and their air-breathing with hardy nature, suitable reproductive strategy, nutritional efficiency serving as food to humans and attainment of large population in a short time. Also called the sharp tooth catfish (*Clarias gariepinus).* It is widely attributed in Africa, where it occurs in almost any freshwater, rivers and rapid habitat but favours floodplains, large slow rivers, lakes and dams. They are mostly bottom dwellers and an air breathers as they spend some time at surface. The fish is omnivorous, feeding on fishes, birds, frogs, small mammals, reptiles, snails, crabs and other invertebrates. It is also capable of feeding on seeds and fruits. Fish accumulate toxic chemicals such as heavy metals directly from water and diet, contaminant residues may ultimately reach concentrations hundreds or thousands of times above those measured in the water, sediment and food (Osman *et al.,* 2007). Heavy metals are normal constituents of marine environment that occur as a result of pollution principally due to the discharge of untreated wastes into rivers by many industries.

Bioaccumulation of heavy metals in tissues of marine organisms has been identified as an indirect measure of the abundance and availability of metals in the marine environment. Kidney analysis in fishes are done in other to test the kidney performances and tests carried out therein are; Urea, Creatinine and Electrolyte. Abnormal levels of these tests indicate a kidney or liver related disease or condition.

Urea (Blood urea nitrogen) test measures the amount of nitrogen in the blood that comes from the waste product. Urea is made when protein is broken down in the body. A BUN test is done to see how well the kidneys are working, if the kidneys are not able to remove urea from the blood normally, the BUN level raises.

Creatinine is a waste product of muscle turnover. Creatinine also increases as kidney function decreases. Few influences outside the kidney affect creatinine concentration, so it is a better marker of kidney function than BUN.

One thing that does affect creatinine is muscle mass, it is measured as a simple blood. Urea and creatinine are nitrogenous end products of metabolism, taken together the BUN and creatinine levels provide a very accurate estimation of how well the kidneys are working. Both tests are related and are associated with the complete metabolic profile (CMP). Either test can be run on a blood sample or urine sample.

Electrolyte reserves are the ions balance that change within certain limits depending on metabolic activities caused by some environmental factors such as pollution. In fresh water fishes, blood and electrolyte concentrations are regulated by interacting processes, such as absorption of electrolyte from the surrounding medium through active mechanism mainly at the gills and through selective re-absorption of electrolytes from urine. Any alteration in one or more of these processes results in a change in the plasma electrolyte composition.

The gill epithelium of the fish is the major site of gas exchange, acid-base balance, ionic regulation, and excretion of nitrogenous waste (Thopon *et al.,* 2003). Both the kidney and liver plays a major role in metabolism excretion, digestion and storage of various substances, including some that are toxic to fish. Histopathological alterations in fish liver and kidney are key indicators of chemical toxicity, and it is a useful way to study the effects of exposure of aquatic animals to toxins present in the aquatic environment (Thopon *et al.,* 2003; Athikesavan *et al.,* 2006; Loganathan *et al.,* 2006).

In view of the need for knowledge of the aquatic side-effects of pesticides, the objective of this study is set to determine its effect majorly on kidney of test organism (*Clarias gariepinus*). Tests such as urea, creatinine and electrolytes (essential for the activity of many enzymes) will be examined, also known as kidney analysis.

GENERAL DESCRIPTION OF EXPERIMENTAL FISH (*CLARIAS GARIEPINUS*)

Catfish of the genus *Clarias* is a prominent freshwater, omnivorous species that are cultured in various parts of the world. This specie has been cultured at various levels of intensity in earthen ponds and re-circulating water systems. The level of production intensity largely the nutritional regime employed, which ranges from organic fertilization to nutritional complete prepared diets. it has been recognized that the African catfish was one of the most suitable species for aquaculture in Africa (Hogendoorn, 1979) and since the seventies, it has been considered to hold great promise for fish farming in Africa. The African catfish having a high growth rate, being resistant to handling and stress, and is being appreciated in a wide number of African countries.

Habitat

They inhabit a variety of fresh water environments including rivers and rapids, large slow rivers and dam as well as lakes. They secrete mucus in extreme drought condition in other to prevent drying. They also can live in turbid waters as they can withstand temperature of 8-35°C and a pH of 5.6-8. They are mainly bottom dwellers but spend some time at the surface.

Breeding and reproduction

This species participate in mass spawning, breed in summer after Rainy season with optimal temperature for growth is 28-30°C. Eggs are laid on vegetation and hatch within 25-40 h, larvae are free swimming and species can live up to 8 years or more.

External anatomy

Clarias gariepinus possess an elongated body with fairly long dorsal and anal fins, a pectoral fin with spines toothed on the peripheral areas. This species can attain sizes up to 1.7 m (total length) and can weigh up to 59 kg when fully mature. Possess nasal and maxillary barbels and relatively small eyes.

Their skin is smooth, exhibiting a dark grey colour dorsally and a cream to white colour ventrally. Scales are absent.

Adults possess a dark longitudinal line on either side of the head, however, this is absent in younger ones. The Head is large, depressed and heavily boned and coarsely granulated in Adults, while the head vis smooth in young ones.

The mouth is large and sub-terminal. Also have fine pointed bands of teeth (Plates 1 and 2).

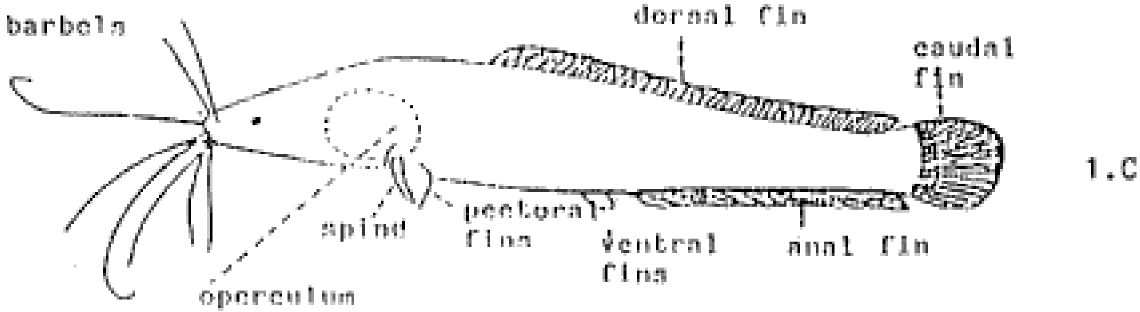

Plate 1. External anatomy of *Clarias gariepinus.*

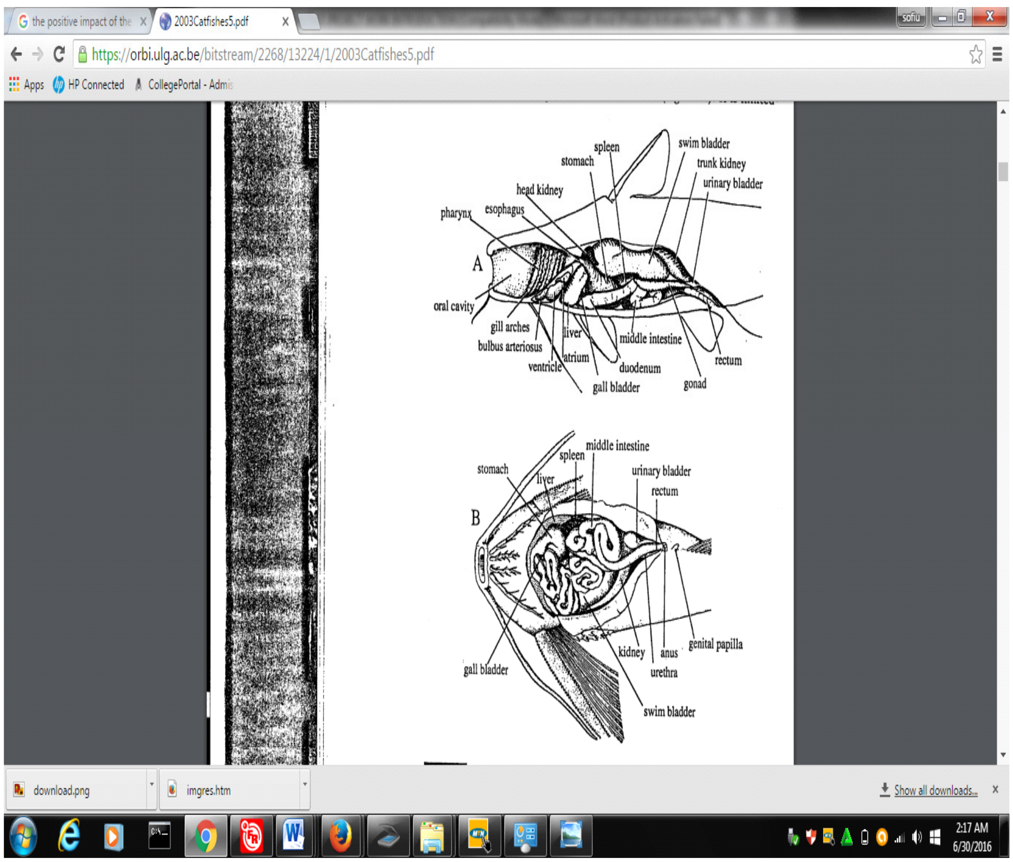

Plate 2. Internal Anatomy of *Clarias gariepinus.*

Feeding habit and behavior

They are omnivores and are not specific in their food requirements as they feed on insects, planktons, snails, crabs, shrimps and other invertebrates and are also capable of eating dead animals, birds, reptiles, fish, eggs and plant matter such as fruit and seeds. They are poor swimmers and spend most of the time on the bottom of lakes and river. They hunt in packs on occasion by herding and trapping small fish. During inter-specific aggressive interactions, they emit an electric organ discharge that is head-positive lasting 5-260 ms.

Economic importance

Clarias gariepinus is considered a food source for humans and imported in countries for aquaculture and game fishing.

Kidney analysis

Various monitoring tools and assessment protocols has been develop to assist in evaluating fish health and subsequently monitoring aquatic pollution for not just the safety of the organism but also the consumers at large.
Methods such as Diacetyl and Fearon, Nesselerization method, popular jaffe spectrophotometric method, kit method e.t.c. all are used to test for the general health and organs particularly kidney,

Tests examined in kidney analysis

Urea test

Urea is a nitrogenous end product of metabolism. Urea is the primary metabolite derived from dietary protein and tissue protein turnover and is relatively a small molecule (60 and 113 Daltons, respectively) distributed throughout total water body. BUN means Blood Urea Nitrogen; it is a waste product produced from the breakdown of protein. Blood urea is removed from the body through the urine and BUN level increase as kidney function decreases. Increase in protein introduced into the intestines which are to be digested (such as a very high protein diet of meat or blood proteins from a bleeding ulcer) can increase urea in the blood. Dehydration also increases the urea value. Urea is measured as a simple blood test. It is produced when the livers participate in protein metabolism and it is usually eliminated from the body by the kidneys. Therefore, both the livers and the kidneys must be functioning properly for the body to maintain a normal level of urea in the blood.

Creatinine test

Creatinine is the product of muscle creatinine catabolism and a substance body produces during normal metabolism. The body eliminates creatinine almost exclusively through the kidney (filtration process), so measurement of creatinine is an accurate estimation of how well the kidney filtration processes are working. Anything that alters the ability of kidneys to filter efficiently (such as dehydration) can cause changes in creatinine levels in the blood. Creatinine also increases as kidney function decreases. Few influences outside the kidney affect creatinine concentration, so it is a better marker of kidney function than urea. One thing that does affect creatinine is muscle mass. It is measured as a simple blood test. The urea and creatinine levels provide a very accurate estimation of how well the kidneys are working.

Electrolyte test

The blood contains numerous chemical substances, many of which have clinical significance. Abnormalities in blood chemistry may be indicative of the presence of a disease process. Electrolytes, the salts in the body, are a specific group of chemicals that must remain in balance for the body to function normally. Electrolytes analysis maybe ordered by a physician as a general screening for disease or to evaluate the health of specific organs in the body (Giles, 1984). Electrolytes exist as charged particles, called ions, and are responsible for the electrical communication required for many bodily functions including brain, muscle and nerve activity. Those commonly measured include sodium, potassium, chloride, calcium, phosphorus, magnesium and bicarbonate are determined using the kidney or blood serum of a catfish.

METHODOLOGY

A total of twenty catfishes (*Clarias gariepinus*) with uneven lengths and weights were collected from Jabi Lake, a natural water body in the Jabi district of Abuja, has an amazing site alongside its green vegetation with Coordinates: 9°4'38"N and 7°25'18"E. They were transported in 50 litre container trough (whose mouth was covered by a net) by car to the Department of Biological Sciences, University of Abuja. On arrival, the fish were accustomed individually in ponds for nine (9) days.

Experimental design

Study area

This study will be carried out in Jabi Lake, which is a natural water body in the Jabi district of Abuja; it is about ten minutes drive from the city centre. A man-made lake, located between Jabi and Kado Districts, has an amazing site alongside its green vegetation with Coordinates: 9°4'38"N and 7°25'18"E. Temperature of the area ranging between 30°C to 35°C annually. Jabi district had and estimated population of 979,876 people. The physical features of the lake include the water colour and its constituents i.e. several aquatic organisms such as fishes, insects etc. having a pH between 6 and 8. Environmental activities around the lake are mall, park that serve as a recreational benefit to occupants of the district. This research work was conducted in Two (2) weeks and Three (3) ponds were used. A total of Twenty (20) adult of *Clarias gariepinus* were stocked separately in ponds and labeled as pond 1 (P1), pond 2 (P2), and pond 3 (P3) respectively.

Collection of samples

The fish samples were collected from Jabi Lake, Abuja. These samples were collected using cast net and transported immediately in a bucket to University of Abuja, Faculty of Science, Department of Biological Science laboratory for analysis, weight and length of this samples were measured.

Urea test and creatinine

After the preliminary investigation of the length and weight, the fishes were placed belly upward and blood samples were obtained from the caudal circulation with the aid of a disposable plastic needle and syringe 5 ml. The use of plastic syringe is a necessary precaution with fish blood because contact with glass results in decreased coagulation time. The site chosen for puncture (about 3 – 4 cm from the genital opening) was wiped dry with tissue paper in other to avoid contamination with mucus. This needle was inserted perpendicularly to the vertebral column of the fish and gently aspirated during penetration. It was then pushed gently down until blood started to enter as the needle punctured a caudal blood vessel. Blood was taken under gentle aspiration until about 4ml has been obtained, then the blood was gently transferred into lithium heparin anticoagulant tube and allowed to clot at room temperature for 30 – 40 min. Blood samples were centrifuged at 4000 rpm for 10 min, serum separation is done using a Pasteur pipette and transferred into an anticoagulant free test-tube and stored in a refrigerator ready for analysis (urea or creatinine).

Electrolyte test

At the end of the experiment, fish were killed and dissected for collection of kidney samples. Then 0.5 g of each of this organ was macerated with pestle and mortar. 5mls of deionized water were added to each of the samples in turn, the samples were then centrifuged at the rate of 3000 rpm for 10 min. The supernatants were then removed and stored in plain bottles at 20°C for electrolyte analysis.

Data analysis

The obtained data after 10 days acclimatization period were subjected to statistical analysis using one-way analysis of variance (ANOVA) to test for level of significance between the various levels of Urea and Creatinine of the three tanks. The descriptive statistics mean and standard deviation were also analyzed. For the Electrolyte; Control values and experimental values were obtained after 4 days exposure period. All analyses were performed using the software program (Statistical Package for Social Sciences version 16.0). The data is presented as mean ± standard deviation.

RESULTS

The maximum weight recorded is 850 g while the minimum weight recorded is 550 g, the maximum length recorded is 49 cm while the minimum length is 43 cm, the maximum level of Urea recorded is 20.5 mg/dl while the minimum level recorded is 5.9 mg/dl. The highest level of creatinine recorded is 1.91mg/dl and the lowest level is 0.19 mg/dl (Table 1). The maximum weight recorded is 500 g while the minimum weight recorded is 340g, the maximum length recorded is 39.5 cm while the minimum length is 34.5cm, the maximum level of Urea recorded is 28.8mg/dl while the minimum level recorded is 10.45 mg/dl. The highest level of Creatinine recorded is 0.31mg/dl and the lowest level is 0.19 mg/dl (Table 2).

The maximum weight recorded is 500 g while the minimum weight recorded is 350 g, the maximum length recorded is 42.0 cm while the minimum length is 38.5cm, the maximum level of Urea recorded is 23.4 mg/dl while the minimum level recorded is 2.04 mg/dl. The highest level of creatinine recorded is 1.53mg/dl and the lowest level is 0.35 mg/dl (Table 3).

Electrolyte

Electrolyte Test result using the kidney of *Clarias gariepinus* exposed to different circumstances which are Control (0.00 ppm) and experimental groups (20 and 60 ppm) respectively. Fishes exposed to 20 ppm (group II) of Cypermethrin had a slight increase in Chlorine (Cl) values (108.07±0.47) as against the control group (group I) which has (77.99±4.32) as Chlorine (Cl) values. On the other hand, fishes exposed to 60ppm (group III) of Cypermethrin showed a significant increase (109.2±0.42) in Chlorine (Cl) values as against groups I and II (20 and 60ppm) with 77.99±4.32 and 108.07±0.47 respectively. The potassium (K) values shows that the fish exposed to 20 ppm (group II) of Cypermethrin had a significant increase in potassium (K) values (6.17±0.93) as against the control group (group I) which has (3.95±0.68) as potassium (K) values. Fish exposed to 60ppm (group III) of Cypermethrin showed a significant increase (6.85±0.78) as pottasium(K) values as it is in (group II) 60 ppm with 6.17±0.93. The Sodium (Na) values shows that the fish exposed to 60 ppm (group III) of Cypermethrin

Table1. Urea and creatinine result for fishes in pond one

WEIGHT(g)	LENGTH(cm)	UREA(mg/dl)	CREATININE(mg/dl)
550.0	43.0	14.4	0.39
700.0	47.0	19.8	0.37
600.0	43.0	16.2	0.38
550.0	45.0	7.2	0.19
850.0	49.0	20.5	0.4
650.0	46.0	9.27	1.91
650.0	44.4	5.9	0.39
850.0	47.5	6.6	1.67

Table 2. Urea and creatinine result for fishes in pond two

WEIGHT(g)	LENGTH(cm)	UREA(mg/dl)	CREATININE(mg/dl)
370.0	37.0	12.6	0.31
390.0	39.0	28.8	0.95
340.0	34.8	10.8	0.52
500.0	34.5	14.44	1.46
370.0	37.0	10.45	0.9
480.0	39.5	13.35	0.95

Table 3. Urea and creatinine result for fishes in pond three

WEIGHT(g)	LENGTH(cm)	UREA(mg/dl)	CREATININE(mg/dl)
400	42.0	16.2	0.42
350	40.0	23.4	0.49
410	38.5	2.04	0.35
460	39.5	5.09	1.53
500	39.7	5.10	1.09
500	39.0	4.21	0.45

had a slight increase in Sodium(Na) values (147.85±0.21) as against the control group (group I) which has (141.21±5.20) as Sodium (Na) values. On the other hand, fish exposed to 20ppm (group II) of Cypermethrin showed a significant increase (148±1.84) in Sodium (Na) values as against groups I (0.00 ppm) 141.21±5.20 as Sodium value (Table 4).

Statistical analysis

The mean of the Length and Weight were 45.61cm and 6.75 g respectively. The mean of the urea and creatinine were 12.48 mgd/L and 0.71 mgd/L respectively (Table 6).

Interpretation of result for pond one

From the descriptive statistics table above, the mean weight is 6.75 and the standard error is 42.26 and the standard deviation is 119.52, in addition the Length(cm) average mean is given as 45.61 and the standard error is 0.76 and the standard deviation is 2.16, the urea (mg/dl) average mean 12.48 and standard error 2.12 and the standard deviation is 5.99, lastly the creatinine (mg/dl) average mean tends to be 0.71 and the standard error is 0.24 while the standard deviation is 0.67.

Using $P < 0.05$ level of significance, length (cm) is not significant to the weight i.e. $P > 0.05$ (0.208> 0.05), the Urea (mg./dl) is significant to the weight i.e. $P < 0.05$ (0.00<0.05) and the creatinine is also not significant to the weight since 0.405>0.05. It can be observed from the table that creatinine of *Clarias gariepinus* in group one does not depend on the weight while Urea of *Clarias gariepinus* depends on weight. The low levels of creatinine recorded might be related to low muscle build-up in the catfishes, low carbohydrate intake and also dehydration while the significantly high level of Urea also called Azotaemia might be due to high intake of protein from diet or the unchanged water is polluted by

Table 4. Electrolyte Result at different concentrations of Cypermethrin

	Chlorine values (mmol)	Sodium values (mmol)	Pottasium values (mmol)
0.00ppm	77.99±4.32	141.21±5.20	3.95±0.68
20ppm	108.07±0.47	148±1.84	6.17±0.93
60ppm	109.2±0.42	147.85±0.21	6.85±0.78

Table 5. Kidney Electrolyte value (mmol)

GroupI	Na	K	Cl
	144.4	4.5	81.2
	138.7	3.6	78.8
	136.3	4.9	72.4
	137.4	3.7	72.5
	142.3	3.5	80.1
	152.3	2.8	74.2
	140.1	4.5	81.5
	138.2	4.1	83.2
GroupII	147.2	5.9	108.6
	150.1	7.2	107.9
	146.7	5.4	107.7
GroupIII	148.0	7.4	108.9
	147.7	6.3	109.5
Range limit	136-145	3.5-5.1	98-107

Table 6. Descriptive statistics for pond.

	Total number	Mean	Std. Error	Std. deviation
WEIGHT(g)	8	6.75	42.26	119.52
LENGTH(cm)	8	45.61	0.76	2.16
UREA(mg/dl)	8	12.48	2.12	5.99
CREATININE(mg/dl)	8	0.71	0.24	0.67
Valid N (list wise)	8			

their waste.

Interpretation of result for pond two

From the descriptive statistics table above, the mean weight is 4.08 and the standard error is 26.76 and the standard deviation is 65.55, in addition the Length(cm) average mean is given as 36.97 and the standard error is 0.84 and the standard deviation is 2.07, the Urea (mg/dl) average mean 15.07 and standard error 2.81 and the standard deviation is 6.89, lastly the creatinine(mg/dl) average mean tends to be 0.85 and the standard error is 0.16 while the standard deviation is 0.40. Using $P < 0.05$ level of significance, length (cm) is significant to the weight i.e. $P < 0.05$ ($0.00<0.05$), the Urea (mg./dl) is significant to the weight i.e. $P < 0.05$ ($0.00<0.05$) and the creatinine is also not significant to the weight since $0.610>0.05$. It can be observed from the table that creatinine of *Clarias gariepinus* in pond two does not depend on the weight while Urea of *Clarias gariepinus* depends on weight. The normal levels of creatinine recorded might be related to normal muscle build-up in the catfishes, normal carbohydrate intake and also normal respiration processes while the significantly high level of Urea also called Azotaemia might be due to high intake of protein from diet or the unchanged water is been polluted by their waste.

Interpretation of result for pond three

From the descriptive statistics table above, the mean weight is 4.37 and the standard error is 24.59 and the standard deviation is 60.22, in addition the Length(cm) average mean is given as 39.78 and the standard error is 0.49 and the standard deviation is 1.21, the Urea (mg/dl) average mean 9.34 and standard error 3.47 and the standard deviation is 8.50, lastly the creatinine(mg/dl) average mean tends to be 0.72 and the standard error is 0.20 while the standard deviation is 0.48. Using $P < 0.05$ level of significance, length (cm) is significant to the weight i.e. $P < 0.05$ ($0.00<0.05$), the Urea (mg./dl) is significant to the weight i.e. $P < 0.05$ ($0.00<0.05$) and the creatinine is also significant to the weight since $0.00<0.05$.

It can be observed from the table that creatinine of *Clarias gariepinus* in pond three does not depend on the weight while Urea of *Clarias gariepinus* depends on weight. The normal levels of creatinine recorded might be related to normal muscle build-up in the catfishes, normal carbohydrate intake and also normal respiration processes while the slightly normal level of Urea might be due to normal kidney function.

DISCUSSION

This study deals with the urea, creatinine and electrolyte levels of catfishes gotten from Jabi lake with varying length and weight. There are variations in all the weight, length, urea and creatinine of *Clarias gariepinus* measured during the study. Similar variations have been reported in the urea and creatinine profile of other Catfishes by other researchers. The result of the study showed a slight decrease in the values of the urea and creatinine of the *Clarias gariepinus* in pond one and pond two compared to pond three. The increase that was observed in the urea and creatinine in pond three 3 catfishes fed with normal diet with high carbohydrate concentration is in collaboration with the findings of Joshi *et al.* (2002) that survival of fish can be correlated with increase in anti-body production which helps in the survival and recovery. Urea and creatinine have been widely used in clinical diagnosis of diseases and pathologies of human and domestic animals. The applications of urea and creatinine techniques have proved valuable for fishery biologists in assessing the health of fish (Fagbenro et al., 1993. Some of the values are slightly low due to the condition under which the fishes were kept, the condition based on the fact that the fishes are not in their natural habitat and also because of the sizes of the fishes, values such as the creatinine is affected due to size. The Urea level observed in *Clarias gariepinus* raised in pond three (3) was about two times higher than those reported by Oyelese *et al*. (1999) for adult catfish. The result showed significant increases in the levels of creatinine and urea in most of the catfish. since increase in these values are used as indicators of renal failure, it can be postulated that the stress passed through by the fish during capturing or the method of capturing them during the experiment is related to the impairment of the renal. It is reported in literature (national kidney literature, 2002) that creatinine is a more accurate marker of kidney disease than urea. High creatinine level implied that many waste products in the fish bloodstream would not be cleared, indicating that the kidneys were not functioning properly. The mean Urea and creatinine level of *Clarias gariepinus* obtained in this study is not in accordance with that of other workers. The differences may be due to differences in climatic and environmental factors in the places from where the species of fish were obtained. Creatinine level greater than 1.5 mgdl or lower than 0.8 mgdl is considered high or low which means it is abnormal while Urea level greater than 7.1 mgdl or lower than 1.8 mgdL is abnormal as well. Abnormal creatinine levels may be due to any of the following conditions that affect the kidneys or muscle, drastic variations in normal creatinine level may indicate urinary tract obstruction, kidney failure, dystrophy, reduced blood flow to the kidneys, pre-renal azotaemia e.t.c. while abnormal Urea level may indicate congestive heart failure, gastrointestinal bleeding, kidney failure or kidney disease. The result of this experiment revealed that *Clarias gariepinus* in pond one have high levels of urea and low levels of creatinine while pond two have high urea levels but normal creatinine level. Creatinine and Urea levels of pond 3 are within normal range. The catfishes in pond three have very high levels of Creatinine with 1.91mg/dl being the highest level recorded and is said to be abnormal which may be as a result of the muscle built up in the fishes or stress passed through while the lowest Creatinine level was also recorded to be 0.19 mg/dl which may be due to shock, congestive heart failure, e.t.c. The highest level of Urea was recorded to be 20.5mg/dl which is within high range, while 2.04 mg/dl is the lowest level which may be due to gastrointestinal bleeding, dehydration, starvation or urinary tract obstruction but it's within normal range. Since *Clarias gariepinus* is one of the most frequently cultured fish in Nigeria, there is need to carry out more of these haematological studies so that reference intervals can be determined for different population of the fish.

The electrolyte balance of the body is an important factor in fluid distribution, intra and extra cellular acidobasic equilibrium, maintaining osmotic pressure of the body fluids and normal neuro-muscular irritability. Thus, the concentration of 60ppm of cypermethrin after a 4 days exposure has been most toxic and unbearable to the test fishes.

CONCLUSION

This study provides valuable data on the haematology of *Clarias gariepinus* that could be used as baseline data for future studies and monitoring of the health status as well as production of the fish for the fish farmers. This shows that the concentration of Na, K, and Cl in the kidney of the experimental fish in pond one all were within normal range limits. While Na, K and Cl at both pond 2 and 3 are all above normal range limits. Hence, it is a good bio-maker of the effects of Cypermethrin and similar stressors to the aquatic environment. The result also revealed that weight has an effect on the creatinine level of *Clarias* gariepinus, showing an increase in the haematological parameters of the fish species. Creatinine is significant to weight which is visible in group three that have fishes ranging between 550-850 g and using $P<0.05$ level of significance, creatinine depended on the weight where 0.00<0.05.

Recommendation

Stress, handling of catfishes and certain kidney diseases has effects on the levels of both urea and creatinine as a result of the kidney functions. Therefore, catfishes should be handled carefully during harvesting or experimentation and they should check often for diseases affecting catfishes to aid kidney functions. It is also recommended that more research should be made on the haematological parameters of fishes to provide adequate information on the normal levels of the various parameters for further works in future. Accumulation of the checked Electrolyte could predispose consumers to possible health hazards. Periodic monitoring of these and other heavy metals in fish and river system to ensure continuous safety of people in the area is recommended. Safe disposal of domestic wastes and industrial wastes should be practiced and where possible recycled to avoid contaminants from going into the environment.

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