











MCH (pg)	19.17±0.17	17.80±1.02	18.83±0.37	18.80±0.20
MCHC (g/dL)	29.17±0.17	27.40±1.12	32.50±0.62*	27.60±0.68
PLT (×10 <sup>9</sup> /L)	620.83±52.81	567.00±96.41	252.00±50.38*	670.40±55.72
LYM (%)	86.83±4.06	85.00±4.18	82.83±5.89	86.40±3.14
NEUT (×10 <sup>9</sup> /L)	11.83±3.68	11.83±3.58	14.40±5.20	13.20±3.11
EOSI (×10 <sup>9</sup> /L)	1.53±0.34	1.40±0.76	1.90±0.22	1.40±0.43
BASO (×10 <sup>9</sup> /L)	1.10±0.28	2.45±0.43	2.50±1.50	3.40±2.23

Data presented as Mean ± SEM: n = 6, One way ANOVA, followed by Dunnett's post hoc for multiple comparison \*significantly different from the distilled water (DW) control at p<0.05. DW = distilled water

(WBC = white blood cells, RBC = red blood cells, HGB = hemoglobin, HCT = hematocrit, MCV = mean corpuscular volume, MCH = mean corpuscular hemoglobin, MCHC = mean corpuscular hemoglobin concentration, PLT = platelet, LYM = lymphocyte, NEUT = neutrophils, EOSI = eosinophils, BASO = basophils).

**Table 2: Effect of 28 days oral administration ethanol leaf extract Terminalia chebula on renal indices and electrolytes in wistar rats.**

Renal indices and electrolytes	Treatment (mg/kg)			
	DW(10ml/kg)	200 mg/kg	400 mg/kg	800 mg/kg
Potassium (mmol/L)	6.30±0.21	7.11±0.69	5.62±0.38	5.78±0.15
Sodium (mmol/L)	136.00±1.90	142.33±2.02	149.00±1.97*	140.25±1.31
Chloride (mmol/L)	114.00±5.77	98.80±6.41	105.20±1.18	110.50±1.66
Urea (mmol/L)	9.56±0.29	9.42±0.60	9.11±0.20	8.67±0.36

Creatinine            65.40±9.13            74.41±12.12\*            64.82±16.11            69.70±5.25  
(µmol/L)

Data presented as Mean ± SEM: n = 6, One Way ANOVA, followed by Dunnett's post hoc for multiple comparison \*significantly different from the distilled water (DW) control at p <0.05. DW = distilled water.

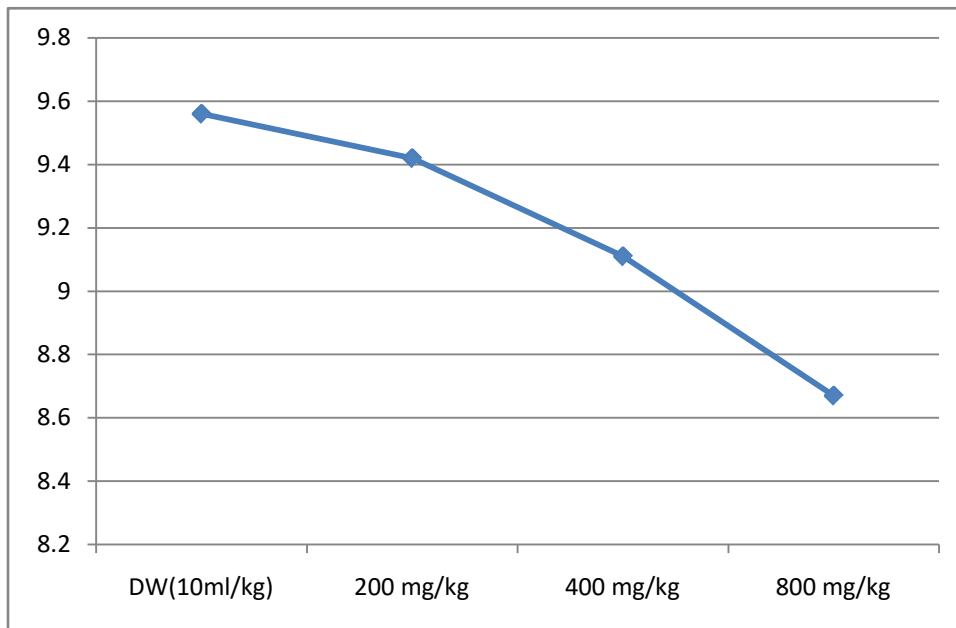


Figure 1: Effect of *Terminalia chebula* on level of serum urea level

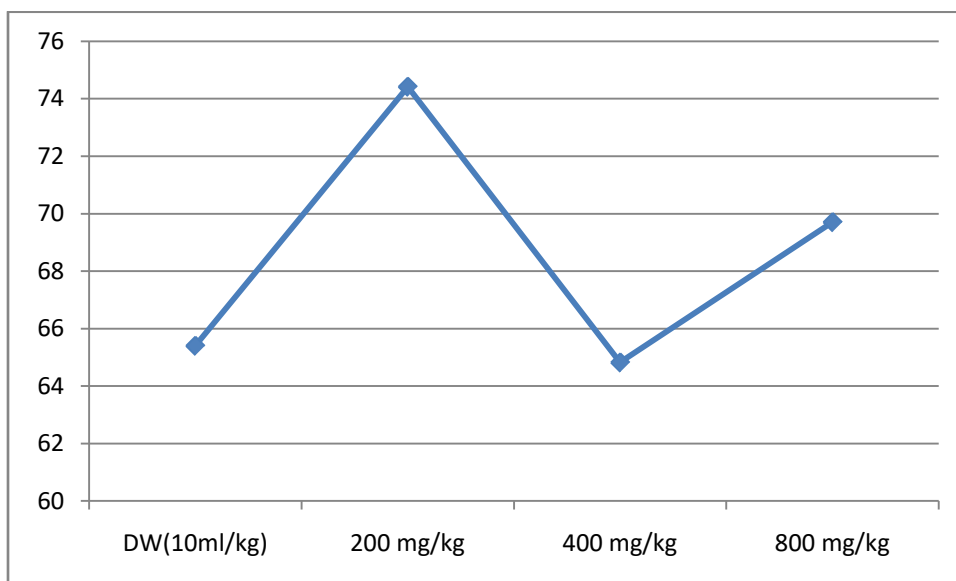
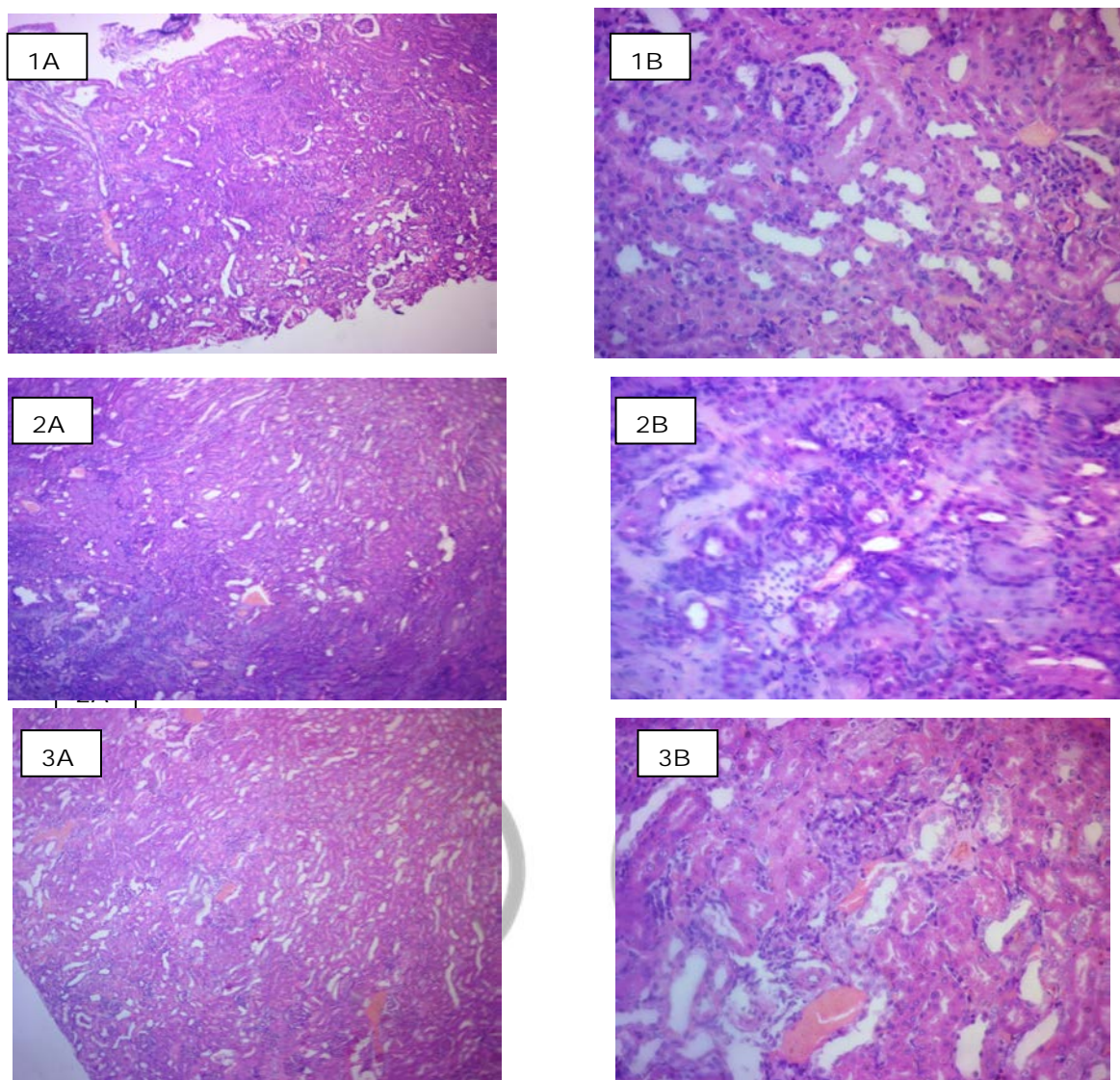


Figure 2: Effect of *Terminalia chebula* on level of serum creatinine level



**Figure 4:** Histological sections of Kidneys of rats treated with Normal saline 10 ml/kg (1), *Terminalia chebula* 200 mg/kg (2), *Terminalia chebula* 200 mg/kg bw (3) and *Terminalia chebula* 400 mg/kg at magnification A (x100) and B(x400) ) stained with H&E Technique.

### Discussion

Traditionally, plants and plant extracts were used to cure many diseases and disorders. However, before usage it is of utmost important to ensure its safety<sup>17,18</sup>. The extract may be therapeutically very efficient but if its toxicity assessment is not worked out, it will not be accepted. Hence, toxicity assessment of plants with proven therapeutic use is of utmost important<sup>19</sup>. Toxicity data are required to predict the safety associated before the use of medical products<sup>20,21</sup>. There have been reports of accidental medicinal plant poisoning and over dose. In most cases this traditionally formulated drugs are consumed without appropriately establishing the dose that is safe for use. This has resulted into many untoward after effect<sup>23</sup>. Hematological parameters are



useful indices that can be employed to assess the toxic potentials of plant extracts in living systems<sup>24</sup>. They can also be used to explain blood relating functions of chemical compound/plant extract. Present result showed that ethanol leaf extract of *Terminalia chebula* caused a reduction in the level of red blood cells, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration which means that it can significantly reduce oxygen carrying capacity of the blood and thus cause anemia<sup>6,25</sup>. Anemia is a condition where the blood has insufficient red blood cells to carry oxygen from the lungs. to the rest of the body or not enough hemoglobin, the iron-rich protein that carries oxygen inside the red blood cells and gives blood its red color<sup>26</sup>. Anemia takes several forms and may vary in severity and duration<sup>19</sup>. Also reductions in packed cell volume (PCV) and red blood cell (RBC) were also observed in rats administered with the extract. This implies that *Terminalia chebula* could cause disturbances in osmoregulatory system of the blood cells and/or oxidative injury to the cell membrane. The extract could suppress the haemopoietic system. The reduction may have also occurred due to lysis of blood cells. Sule et al,<sup>20,26</sup> also observed decrease in RBC, PCV, hemoglobin and lymphocytes in rats fed with extracts of *Acalypha wilkesiana*. The major functions of the white blood cell and its differentials are to fight infections, defend the body by phagocytosis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response<sup>26</sup>. The extract had no effect on white blood cell parameters, suggesting that it has no effect on the immune cells and the immune system.

An increase creatinine level can be observe in some kidney diseases, due to loss of normal excretory function of the creatinine, when there is a muscular cells damage or following an incompatible medication interfering with the normal functioning of the kidney<sup>27</sup>. Creatinine, is mostly derived from endogenous sources by tissue creatinine breakdown<sup>12,23</sup>. The serum creatinine concentration of the group that received 200 mg/kg of the extract was slightly higher than the control group. Atangwho et al.<sup>22</sup> reported elevated serum creatinine level as an indicator of possible kidney dysfunction. Gross et al.<sup>18</sup> in a study indicated that a rise in serum creatinine level could suggest a possible damage to the functioning nephrons of the kidney. The measurement of creatinine concentration in serum was a useful index for the diagnosis of chronic kidney disease and when serum creatinine level was higher than the normal value, renal failure was most likely a possible outcome<sup>28</sup>. Increased serum creatinine concentration has been considered a marker of assessing nephrotoxicity as reported by Anwar et al.<sup>10</sup> and Ali et al<sup>17</sup>. it is also possible that at high dose the antioxidant activity of *Terminalia chebula* becomes conspicuous, negating and possibly providing protective property to cells. In this study, serum

urea was unaffected suggesting that the plant may cause slight damage to the kidney. Thus serum urea concentration is often considered a more reliable renal function predictor than serum creatinine<sup>28,29</sup>. The histopathological analysis, showed that in all groups after 28 days administration of ethanol extract of Terminalia chebula the kidney there was slight changes at the cellular level in comparison to control. This resonates with other parameters that the leaves of the plant slightly have nephrotoxic effect over a long period of time.

**Conclusion:** Result from the study suggests that the plant possesses may have no toxic consequences on the kidney and the urinary system. Further study is needed to evaluate its nephroprotective activity.

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