



Effects Of *Maytenus Senegalensis* (L) and *Cassia Alata* (L) Extracts on the Liver Enzymes of Albino Rats, Infected with Schistosomes Cercariae

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ABSTRACT: This research aim was to evaluate some liver enzymes of albino rats subjected to administration of methanol and water extracts of *Maytenus senegalensis* and *Cassia alata* after infection with schistosome cercariae. As curative agents, the extracts were well tolerated by rats. The total protein (69.0-77.9g/l and 71.8- 79.1g/l) for methanolic extracts of and (64.3-74.3g/l and 70.3- 77.5g/l) for water extracts for *M. senegalensis* and *C. alata* respectively. The Alkaline phosphate values range from (145-226iu/l and 189-207iu/l) for methanol and (143-234iu/l and 195-207iu/l) for water as for *M. senegalensis* and *C. alata* extracts. The Aspartate aminotransferase values were (7.7-8.7iu/l) for *M. senegalensis* and (8.0-8.6iu/l) for *C. alata* with methanol extracts and (7.1-8.8iu/l) for *M. senegalensis* and (8.4-8.9iu/l) for *C. alata* water extracts. The Alkaline aminotransferase values range from (5.1-6.3iu/l) for *M. senegalensis* and (3.5-6.4iu/l) for *C. alata* in methanol and (4.2-6.3iu/l) for *M. senegalensis* and (4.1-6.4iu/l) for *C. alata* with water extracts. The Total Bilirubin values of both methanol and water extracts for *M. senegalensis* (6.3-18.9µm/l) and (9.0-12.7µm/l) for *C. alata* and (4.2-6.3µm/l) for *M. senegalensis* and (4.1-6.4µm/l) for *C. alata* respectively were all within the normal values. This indicates that all these extracts were well tolerated. However the 9g/kg body weight of the water leaf extracts, although having normal values were toxic to other organs such as the lungs.

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Schistosomiasis, is a disease caused by digenetic trematodes of the genus *Schistosoma*. Mortality due to this parasitic helminth disease is also estimated at 20,000 due bladder cancer, renal failure as for *Schistosoma haematobium* infection and liver fibrosis and portal hypertension as in the case *S. mansoni*. There are over 800 million people exposed to the risk of getting the infection spread over 77 countries (WHO, 2013). It was further estimated that 18 million people suffered bladder wall pathology and 10 million others were with hydronephrosis (WHO, 2013). In Africa and other affected countries schistosomiasis is associated with agricultural and other rural activities around the freshwater bodies, (John *et al.*, 2008 and Shurrock, 2001). Schistosomiasis affects the health and the economy of infected population by reducing their ability to work (WHO, 2010) and infected people are generally poor and may not have the resources to afford the cost of modern treatment and generally rely on traditional medicine (Mohammed *et al.* 2007). The potential for the development of resistance by schistosomes to PZQ was highlighted in 1995 by its apparently low efficacy when used to treat a newly established focus of *Schistosoma mansoni* in Senegal

(Stelma *et al.* 1995). The use of these plants by humans in curing several ailments poses undoubtedly some problems since doses of such preparations could not be determined. It is also necessary to investigate their therapeutic effects as well as the level of their toxicity to humans. It is for this purpose that *Maytenus senegalensis* and *Cassia alata* had been selected. This work is aimed at screening two medicinal plants as anti-schistosomal agents namely *Cassia alata* and *Maytenus senegalensis* and studying their effects on the biochemical parameters of the host organism. The specific objectives are to screen and evaluate the potential effects of these plants used by traditional herbalists in the body's liver enzymes using laboratory rats as indicators. To compare the properties of the various extracts of the plants using methanol and water as the extracting solvents.

MATERIALS AND METHODS

Collection of Plant materials, Snails and Schistosome eggs: The two plants *Maytenus senegalensis* and *Cassia alata*, were collected and were identified based on the characteristics of the leaves, flowers, fruits, stem- bark, Stanfield and Hopkins (1966), Hutchinson

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and Dalziel (1968). The useful parts of each of the plants (leaves, seed and roots) were washed and dried under shade in the greenhouse. Each part was then separately pounded using a wooden mortar and pestle and then sieved through ordinary flour sieve of mesh size of 0.30 mm and the powder from each was separately stored in labelled air tight polyethene bags until required for use. *Bulinus* snails were collected and kept into clean medium size aquarium, measuring 30 x 45 x 30 cm filled to 2/3 capacity with de-ionized water. The de-ionized water was changed fortnightly to reduce pollution. Urine samples were collected from out patients from clinics and examined for eggs of schistosomes. Stool samples were immediately processed by the keto-kartz method and before being filtered using Wattman No.2 filter paper.

Collection, Rearing and Infection of Rats with Schistosoma Cercariae: Albino Wistar rats used in the experiments were purchased from the National Institute for Trypanosomiasis Research (NITR), Vom, Plateau State. Infected snails were exposed to strong electric light. The cercariae are shedded in the container were allowed to penetrate each of the rats, by paddling method.

Formulation, Administration of Praziquantel and of Plant Materials: The standard anti-schistosomal drug Praziquantel tablets formulated 60mg, Batch No. 121257, Nafdac Reg. No. A4-4246 manufactured by Yanzhou Xier Kangtai Pharmaceutical Co., Ltd. China and marked by Chez Resources Pharm were purchased and used. The drug was administered orally as single dose of 600mg/kg of body weight as recommended by WHO (1980). The quantity of Praziquantel given to each rat was obtained by using the following formulation:

$$\text{Weight of PZQ (mg)} = \frac{600\text{mg} \times W_{\text{tan}}(\text{mg})}{1000\text{mg}} \quad (1)$$

Where W_{tan} = weight of animal

After the treatment, a period of 10-14 days was accorded, after which animals were sacrificed for examination of the therapeutic effect of the drug.

Similarly, plant materials were weighted following the same procedure as above. Thereafter a single oral dose of various concentrations was administered to each rat using stomach gavage using the same formular:

$$\text{WPE (mg)} = \frac{(A)\text{mg} \times W_{\text{tan}}(\text{mg})}{1000\text{mg}} \quad (2)$$

Where WPE = Weight of Plant extract

Where (A) represents the dose: 3, 6 or 9g/kg body weight

Statistical Analysis: Statistical analyzes were performed using the Fisher's test for contingency analysis and the student independent t-test. These analyzes were performed using the Statistical Package for Social Sciences software (SPSS 17.0, Chicago, IL, USA). Continuous variables were expressed as means \pm standard deviation (SD) of the median and range. P-values of less than 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

The lowest and highest values of the biochemical parameters of some of the liver enzymes such as total protein (TPT); serum albumin (SAL); alkaline phosphate (ALP); aspartate aminotransferase (AST); alanine aminotransferase (ALT), total bilirubin (TBB), creatine and Urea and other liver enzymes in treated rats were determined. Results obtained are shown in Tables 1.

Total Protein Count: For the roots of *Maytenus senegalensis* (Table 1), the highest average count in the methanolic extract for the total protein (TPT) was 71.4g/l recorded in rats treated with 3g/kg body weight of the extracts. The lowest average count of 69.0 g/l was recorded in those treated with 9g/kg body weight dose. For the aqueous water extracts, the highest value of 66.7 g/l was found in rats treated with 6g/kg body weight while the lowest value of 64.3 g/l was in those treated with 3g/kg body weight. In the methanolic leaves extracts of *M. senegalensis*, the average highest count of 77.9 g/l was recorded in rats treated at a dose of 3g/kg body weight, while the lowest value of 77.5 g/l was found in those treated with 9g/kg body weight dose. The highest value for the water extracts was 74.3 g/l recorded when the rats were administered the 3g/kg body weight of the extract. Its lowest value of 70.7 g/l was in the 6g/kg body weight treated group.

For the methanolic extracts of stem-bark of *M. senegalensis*, the average highest protein count of 72.8 g/l was recorded in rats given 3g/kg body weight of extracts, while the lowest value of 71.1 g/l was in those given 6g/kg body weight. For the water extracts, on the other hand, the highest value of 71.2 g/l was obtained in rts treated with 6g/kg body weight while the lowest value of 68.6 g/l was obtained in 3g/kg body weight group. For the methanolic extracts of the leaves of *Cassia alata*, the average highest count of 79.9 g/l was recorded in the rats treated with 9g/kg body weight of the extracts with the lowest value of 71.8 g/l recorded in those treated with 6g/kg body

weight. In the water extracts of *C. alata*, the highest average value of the total protein was 77.5 g/l recorded in rats treated with 9g/kg body weight of the leaves extracts of the plant with the lowest value of 70.3 g/l in rats treated with 3g/kg body weight of the extracts. For the methanolic extracts of seeds of *Cassia alata*, the average highest total protein count value of 79.0 g/l was recorded in the 3g/kg body weight rats, while the lowest value of 74.9 g/l was obtained in rats treated with 9g/kg body weight. The highest average value for the water extracts, was 75.0 g/l in rats treated with

6g/kg body weight while the lowest average value of 70.3 g/l was in those treated with 9g/kg body weight extracts groups. These differences are not significant stsisitically ($P \leq 0.05$). Frances (2002), Amir Al-Hroob (2010), and Abdel-Ghaffar, *et al.* (2005) reported that the total protein values of schistosomiasis decreases in chronic infections. This observation contradicts reports of blood chemistry of earlier reports on blood chemistry of *Schistosoma mansoni* in infected rats (Abdel-Hadi and Talaat, 2000); that showed a reduction in the total serum protein.

Table 1: Biochemical changes in Schistosome infected treated rats with various plant extracts and Praziquantel

Plants	Parts	Doses	Methanol Parameters					Water Parameters						
			TPT (g/l)	SAL (g/l)	ALP (iu/l)	AST (iu/l)	ALT (iu/l)	TBB (µm/l)	TPT (g/l)	SAL (g/l)	ALP (iu/l)	AST (iu/l)	ALT (iu/l)	TBB (µm/l)
<i>Maytenus senegalensis</i>	Roots	3g/kg	71.4	49.6	145	7.7	5.8	6.3	64.3	47.6	143	7.1	5.5	8.0
		6g/kg	70.5	49.3	186	8.0	6.3	18.9	66.7	46.7	179	8.3	6.3	19.0
		9g/kg	69.0	49.8	175	7.7	4.7	8.4	66.5	49.4	178	7.9	5.7	8.6
		3g/kg	77.9	51.3	181	8.2	5.9	13.5	74.3	45.6	168	7.7	5.8	12.3
		6g/kg	77.8	37.3	214	8.2	5.1	10.6	70.7	37.9	211	8.8	4.2	8.7
		9g/kg	77.5	37.2	211	8.0	6.2	8.3	72.8	42.9	234	8.4	6.1	14.4
	Stembar	3g/kg	72.8	50.3	208	8.5	6.2	13.1	68.6	47.6	216	8.5	6.3	11.8
		6g/kg	71.1	49.7	226	8.5	4.8	11.8	70.7	48.1	213	8.8	5.5	10.1
		9g/kg	71.8	51.4	206	8.7	5.3	11.8	71.2	47.7	216	8.4	5.7	11.8
		3g/kg	71.8	51.1	202	8.6	3.5	10.9	70.3	48.3	206	8.7	4.6	10.4
		6g/kg	76.1	52.2	200	8.1	6.4	9.5	77.3	50.4	195	8.4	6.4	9.0
		9g/kg	79.1	50.0	196	8.0	6.4	9.0	77.5	50.3	207	8.4	5.7	10.4
<i>Cassia alata</i>	Seeds	3g/kg	79.0	48.9	207	8.5	5.7	12.5	74.5	48.2	206	8.4	6.2	10.4
		6g/kg	75.8	51.4	200	8.6	5.2	12.7	75.0	51.9	203	8.6	5.3	10.1
		9g/kg	74.9	53.7	189	8.4	4.5	9.8	70.3	51.7	206	8.9	4.1	10.9
		PZQ	76.2	51.2	129	8.2	5.8	14.4	76.2	51.2	129	8.2	5.8	14.4
		Non-Infected	70.7	51.9	195	16.3	4.9	17.0	70.7	51.9	195	16.3	4.9	17.0
Control	Inf. Non treated	80.2	72.5	202	18.3	5.4	20.2	80.2	72.5	202	18.3	5.4	20.2	

Total Serum Albumin Count: For rats treated with extracts from the roots of *Maytenus senegalensis*, as shown in Table 1, the highest average count of total serum albumin count in the rats treated with methanolic extracts was 49.8g/l recorded in those given 9g/kg body weight of the extracts, while the lowest average count of 49.3 g/l was recorded in those treated with 6g/kg body weight dose. For aqueous the water extracts on the other hand, the highest value of 49.4 g/l was found in the group of rats treated with a dose of 9g/kg body weight. The corresponding lowest of 46.7 g/l was obtained in those treated with 6g/kg body weight dosage. For the methanolic leaf extracts of *M. senegalensis*, the average highest count the total serum albumin of 51.3 g/l was recorded in rats treated with 3g/kg body weight, while the lowest value of 37.2 g/l was found in the group given 9g/kg body weight concentration of the extracts. In the water extracts, the highest average value was 45.6 g/l also in the given 3g/kg body weight concentration of the extracts. The lowest value of the total serum albumin of 37.9 g/l was in the 6g/kg body weight treated groups. For the methanolic extracts of the stem-bark of *M. senegalensis*, the average highest count of 51.4 g/l was recorded in rats treated with 9g/kg body weight, while the lowest value of 49.7 g/l was obtained in rats given 6g/kg body weight. In the water extracts on the other

hand, the highest average value was 48.1 g/l recorded in the 6g/kg body weight rats while the lowest value of 47.6 g/l was in the rats given 3g/kg body weight dose. For the methanolic leaves extracts of *Cassia alata*, the average highest value count of the total serum albumin of 52.2 g/l was recorded in rats treated with 6g/kg body weight of extracts, while the lowest value of 50.0 g/l in those given 9g/kg body weight. In the corresponding water extracts, the highest average count was in 50.4 g/l recorded in rats both administered with the 6g/kg body weight, while the lowest value of 48.3 g/l was in the 3g/kg body weight group. For the methanolic seed extracts of *Cassia alata*, the average highest count of total serum albumin was 53.7 g/l recorded in rats treated with 9g/kg body weight of extracts, while the lowest value of 48.9 g/l was in those rats in the 3g/kg body weight treated groups. The highest average count was of 51.7 g/l for the water extracts was in rats dosed with the 9g/kg body weight with the lowest value of 48.3 g/l in those treated with 3g/kg body weight.. ANOVA test revealed that these differences are not significant statistically ($P \leq 0.05$). According to Frances (2002), the serum albumin increases with intravenous infusion or dehydration which may not be the case in this research work. The high value of serum albumin in the infected non-treated rats could have be due high

intensity of the infection. Similar observations were made by Hamadto *et al.* (1990).

Alaline Phosphate Count: For the roots of *Maytenus senegalensis* (Table 1) the highest average count in the methanolic extracts for the alkaline phosphate (ALP) was 186iu/l recorded from rats treated with 6g/kg body weight of extracts, while the lowest average count 145iu/l was recorded in those in the 3g/kg body weight treated group. For the aqueous water extracts, the highest value of 179iu/l was found in rats treated with 6g/kg body weight of extracts, while the lowest value of 143iu/l was in those given 3g/kg body weight dosage. For the methanolic leaf extracts of *M. senegalensis*, the average highest alkaline phosphate count of 214 iu/l was recorded in the 6g/kg body weight treated rats, while the lowest value of 181iu/l was found in those treated with 3g/kg body weight. In the water extracts, the highest average value was 234 iu/l in the 9g/kg body weight treated rats with, the lowest value of 168 iu/l recorded in those treated with 3g/kg body weight. For the methanolic extracts from stem-bark of *M. senegalensis*, the average highest count was 226 iu/l recorded in rats treated with 6g/kg body weight of extracts, while the lowest value of 206 iu/l was in those given dose of 9g/kg body weight. For the water extracts, the highest average count was 216iu /l in rats treated both with 3g/kg and 9g/kg body weight while the lowest value of 213 iu/l in those rats treated with 6g/kg body weight dose of extracts. In the methanolic leaf extract of *Cassia alata*, the average highest count of alkaline phosphate was 202 iu/l recorded in rats in the 3g/kg body weight treated groups, while the lowest value of 196 iu/l was found in those treated with 9g/kg body weight. For the water extracts, the highest average count was 207 iu/l recorded in the 9g/kg body weight group while the lowest value of 195 iu/l in the 6g/kg body weight treated groups. For the methanolic extracts of the seeds of *Cassia alata*, the average highest alkaline phosphate count value of 207 iu/l was recorded in rats of the 3g/kg body weight treated groups, while the lowest value of 189 iu/l was in the 9g/kg body weight category. The highest average value for those in the water extracts was 206 iu g/l in rats dosed with both 3g/kg and 9g/kg body weight of extracts. The lowest count was of 203 iu/l recorded in the 6g/kg body weight dose groups. ANOVA test revealed that the differences in these mean counts are not significant ($P \leq 0.05$). The values of alkaline phosphatase (ALP) obtained in this work were all below the ranges. These results further showed that there was no statistical difference at $P \geq 0.05$.

Aspartate Aminotransferase Count: The average counts for aspartate aminotransferase for both treated

experimentally and the control counts are shown in Table1. For the roots, the highest average count for rats in the methanolic extracts of *Maytenus senegalensis* is 8.0 iu/l recorded in those rats given 6g/kg body weight dose of the extracts, while the lowest average count of 7.7 iu/l was recorded in those given both 3g/kg and 9g/kg body weight doses. For aqueous water extract, the highest value of 8.3 iu/l was found in rats treated with 6g/kg body weight while the lowest value of 7.1 iu/l was in the 3g/kg body weight treated groups. In the methanolic leaf extracts of *M. senegalensis*, the average highest count of 8.2 iu/l in the groups given either 3g/kg or 6g/kg body weight of extracts. The lowest value of 8.0 iu/l was found in the 9g/kg body weight group. For the water extracts, the highest average count was 8.8 iu/l for rats treated with 6g/kg body weight dose the lowest mean value of 7.7 iu/l was obtained in the 3g/kg body weight treated rats. For those in methanolic extracts of the stem-bark of *M. senegalensis*, the average highest count of 8.5 iu/l was recorded in the 9g/kg body weight treated rats, while the lowest value of 7.8 iu/l was in those given either 3g/kg or 6g/kg body weight doses. The corresponding value for the water extracts had the highest average count of 8.8 iu /l in the 6g/kg body weight treated rats, while the lowest value of 7.7 iu/l in those dosed with 3g/kg body weight concentration of the extracts. In case of the methanolic extracts from the leaves of *Cassia alata*, the average highest aspartate aminotransferase count of 8.6 iu/l was recorded in the 3g/kg body weight treated rats, while the lowest value of 8.0 iu/l was the group of rats given extracts dose of 9g/kg body weight. In the corresponding water extracts, the highest average count was 8.7 iu/l recorded in rats given 3g/kg body weight. The lowest value was 8.4 iu/l obtained in rats given either 6g/kg or 9g/kg body weight doses of the plant extracts. For the rats subjected to the methanolic extracts of the seeds of *Cassia alata*, the average highest aspartate aminotransferase count value of 8.6 iu/l was recorded in the 6g/kg body weight group, while the lowest value of 8.4 iu/l was in the 9g/kg body weight treated group. For the water extracts, the highest average count was 8.9 iu g/l obtained in the 9g/kg body weight treated group and the lowest value of 8.4 iu/l in the 3g/kg body weight dose category. The values are not significant statistically as revealed by ANOVA test ($P \leq 0.05$). All the results in this research fall within the normal values including the infected non-treated rats. Several reports including Hamalto *et al.*, (1990), Amir Al-hrooth (2000) and WHO, (2003) confirmed the similar trends which all agreed with the results in this investigation.

Alkaline Aminotransferase: For the roots of *Maytenus senegalensis* as shown in Table 1, the highest average

of alkaline aminotransferase (ALT) count in rats treated with methanolic extracts was 6.7 iu/l recorded those treated with both 6g/kg and 9g/kg body weight of the extracts, while the lowest average count of 5.8 iu/l was recorded in the 3g/kg body weight treated groups. For the aqueous water extracts, the highest value was 6.7 iu/l obtained from rats treated with 9g/kg body weight group, while the lowest count of 5.5 iu/l in the 3g/kg body weight treated groups. For the methanolic leaf extracts of *M. senegalensis*, the average highest alkaline aminotransferase count of 7.2 iu/l was recorded in the 9g/kg body weight treated rats, while the lowest value of 5.9 iu/l was found in the 3g/kg body weight group. In case of the water extracts, the highest average count was 7.2 iu/l in the group of rats treated with 6g/kg body weight with the lowest value of 5.8 iu/l obtained in those given 3g/kg body weight dose of the extracts. The trend of the alkaline aminotransferase count for rats treated methanolic extracts of the stem-bark of *M. senegalensis* revealed that the average highest count of 7.8 iu/l was recorded in rats dosed with 6g/kg body weight, while the lowest value of 6.7 iu/l was recorded in the 3g/kg body weight treated groups. For the water extracts, on the other hand, the highest average value is 8.5 iu/l obtained in the 6g/kg body weight dose group. The lowest alkaline aminotransferase count of 6.7 iu/l was in those given dose of both the 3g/kg and 9g/kg body weight of the extracts. For the methanolic leaf extracts of *Cassia alata*, the average highest count was 7.5 iu/l obtained in rats dosed with 3g/kg body weight with the lowest of value of 6.4 iu/l recorded in rats given doses of 6g/kg and 9g/kg body weight of extracts group. The corresponding water extracts, treated rats had the highest average alkaline aminotransferase value of 7.7 iu/l recorded in those administered 9g/kg body weight while the lowest value of 6.4 iu/l was in the 6g/kg body weight treatment group. For the methanolic extracts from the seeds of *Cassia alata*, the average highest count value was 10.7 iu/l was recorded in rats dosed with 3g/kg body weight concentration of the extracts, while the lowest value of 8.2 iu/l was in the 6g/kg body weight group. The highest value for those in the water extracts, was 8.3 iu/g/l in the group given 6g/kg body weight with the lowest value of 8.1 iu/l recorded in the 9g/kg body weight treated group. Similar analysis of the differences by use of ANOVA revealed that these differences are not significant statistically ($P \leq 0.05$). The normal values of Alkaline aminotransferase (ALT) in albino rats vary from 1.4-1.6 u/l (Giknis and Clifford, 2008). The values obtained in this research work with some few exceptions are all above the normal limits according to Frances (2002), the ALT increases in hepatocellular disease, hepatitis, liver tumor etc. The high values observed could be

attributed to the liver disease caused by schistosomiasis.

Total Bilirubin Count: For the roots of *Maytenus senegalensis* as shown in Table 1, the highest average total bilirubin count for the rats treated with methanolic extracts was 18.9 iu/l recorded in the 6g/kg body weight treated group, while the lowest average count of 6.3 iu/l was recorded in the 3g/kg body weight group. For the aqueous water extracts on the other hand, the highest value of 19.0 iu/l was found in rats in the 6g/kg body weight group, while the lowest value of 8.0 iu/l was in those given 3g/kg body weight dose. For those in the methanolic extracts of the leaves of *M. senegalensis*, the average highest total bilirubin count of 13.5 iu/l was recorded in the both 3g/kg and 6g/kg body weight treated rats, while the lowest value of 8.3 iu/l in the 9g/kg body weight treated group. In the water extracts, the highest average total bilirubin count was 14.4 iu/l recorded in the 9g/kg body weight treated rats with the lowest of count of 8.7 iu/l in the group given 6g/kg body weight. For the methanolic extracts of the stem-bark of *M. senegalensis*, the average highest total bilirubin count of 13.1 iu/l was recorded in rats administered 3g/kg body weight extracts, while the lowest value of 11.8iu/l was in rats given both the 6g/kg and 9g/kg body weight extracts. In the water extracts, the highest average count was 11.8 iu/l in the 9g/kg body weight group, while the lowest value of 10.1 iu/l in the 6g/kg body weight group. For the methanolic extracts of the leaves of *Cassia alata*, the average highest total bilirubin count of 10.9 iu/l was recorded in the 3g/kg body weight treated rats, while the lowest value of 9.0 iu/l was in the 9g/kg body weight treated group. For the water extracts, the highest average count was 10.4 iu/l recorded in both the 3g/kg and 9g/kg body weight treated rats, while the lowest value of 9.0 iu/l in the 6g/kg body weight rats. For the methanolic extracts of the seeds of *Cassia alata*, the average highest total bilirubin count value was 12.7 iu/l recorded in the 6g/kg body weight treated rats group, while the lowest value of 9.8 iu/l was in the 9g/kg body weight treated groups. For the water extracts, the highest total bilirubin average count was 10.9 iu/g/l in the 9g/kg body weight treated rats, while the lowest value of 10.1 iu/l was in the 6g/kg body weight treated rats. Subjecting the result to ANOVA test revealed that these differences are not significant statistically ($P \leq 0.05$). The total bilirubin (TBB) values in serum of normal albino rats range between 4 -21 μ mol/l depending on the age and sex according to Giknis and Clifford (2008). These values fall within the standard values except for that of rats in the infected non treated control group which have having a higher values. These difference observed according to El-Sahly, *et al.* (1985) and Omran, *et al.* (1988)

could be due to either, increased haemolysis or iron deficiency that might have occurred during the infection. The direct increase in serum bilirubin may be due to the loss of erythrocytes which may arise from the extrusion of schistosomal ova or because of the consumption of blood by schistosomes as might be observed in highest values of infected non-treated control group (Walaa *et al.*, 2001).

Conclusion: The crude methanol and water extracts from the roots, leaves, stem-bark of *Maytenus senegalensis* as well as that of the leaves and seed of *Cassia alata* showed varying levels of antischistosomal activities on schistosome infected albino rats. The results obtained from the liver enzyme parameters of the extracts treated rats showed that the 6g/kg body weight had a good potential. However the roots of *M. senegalensis* at the dose of 9g/kg body weight are haemolytic effects and had side effects on the lungs and the seed of *Cassia alata* can cause hepatomegaly in rats.

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