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ALBUMIN, BILIRUBIN AND TOTAL PROTEIN IN ALBINO RATS TREATED WITH TEROCAN (AN ANTIMALARIAL).

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ABSTRACT

Most drugs have been shown to elicit various side effects on different tissues and organs. This research was conducted to investigate the effect of Terocan (an antimalarial) on the liver of albino rats. Twenty-five adult male albino rats, used in the study, were randomly placed in five groups (A, B, C, D and E), each group containing five rats. Groups A, B, C and D were administered orally with 7.71, 15.42, 30.84 and 46.26mg/kg body weight respectivelyof the drug solution for seven consecutive days, while group E served as control and was given distilled water only. There was a significant decrease in physical activities, feed and water intake and body weight of the treated groups, while the control group did not show any significant change in this parameters. The result showed a significant increase($P<0.05$) in the levels of bilirubin compared to control. The concentration of albumin in the groups administered the drug was significantly lower ($P<0.05$) than the control, while total protein concentration of the control and test groups did not differ significantly ($P>0.05$) when compared to control. These effects of the drug were found to be dose-dependent.These results suggest that oral administration of Terocan may producetoxic effects on hepatic system.

Keywords: Albumin, Bilirubin, Total protein, Albino rats and Terocan.

INTRODUCTION

Malaria is a mosquito-borne infectious disease of humans and other animals caused by parasitic protozoan's belonging to the *Plasmodium* family. The disease is most commonly transmitted by an infected female Anopheles mosquito. The mosquito bite introduces the parasites from the mosquito's saliva into a person's blood [1]. The parasites travel to the liver where they mature and reproduce.Five species of *plasmodium* can infect and be spread by human's [2]. Most deaths are caused by *P. falciparum* because*P.vivax,P.ovale* and *P.malaria* generally cause a milder form of malaria [1].

Malaria is typically diagnosed by the microscopic examination of blood using blood films, or with antigen-based rapid diagnostic test [2]. Methods that use the polymerase chain reaction to detect the parasite's DNA have been developed, but are not widely used in areas where malaria is common due to their cost and complexity [3]. The risk of disease can be reduced by preventing mosquito bite by using mosquito nets and insect repellents or with mosquito-control measures such as spraying insecticides and draining standing water [2].

Antimalarials are designed to prevent or cure malaria. Such drugs may be used for some treatment of malaria in individuals with suspected or confirmed infection, prevention of infection in individuals visiting a malaria endemic region who have no immunity and routine intermittent treatment of certain groups in endemic regions. Some anti-malarial agents, particularly chloroquine and hydroxychloroquine, are also used in the treatment of rheumatoid arthritis and lupus-associated arthritis [4].

Terocan is an antimalarial drug with a combined therapy of Dihydroartemisinin (40mg) and Piperaquine phosphate (320mg). It is taken via oral administration to a malaria patient. No noticeable side effect of dihydroartemisinin is reported. Possible side effects of piperaquine phosphate include mild dizziness, vertigo, headache, nausea, vomiting, and abdominal discomfort. A bottle of terocan oral suspension is a complete two-day treatment only for infants and children up to 6 years, then for adults and children older than 6 years, it is advisable to use terocan tablets [5].

Albumin is a protein made by the liver. Serum albumin is the main protein of human blood plasma [6]. It binds water, cations, fatty acids, hormones, thyroxin and pharmaceuticals. It's main function is to regulate the colloidal osmotic pressure of blood. Serum albumin is the most abundant blood plasma protein. The human version is human serum albumin and it normally constituents about 50% of human plasma protein. Serum albumins are important in regulating blood volume by maintaining the osmotic pressure (also known as colloid osmotic pressure) of the blood compartment [6].

The normal range of human serum albumin in adults is 3.5 to 5g/dl. For children less than three years of age, the normal range is broader, 2.9-5.5g/dl [7]. Factors that affect serum albumin level includes; protein malnutrition, defective synthesis, hemodilution, acute and chronic inflammation.

Bilirubin (formally referred to a haematoidin) is the yellow breakdown products of normal heme catabolism, caused by the body's clearance of aged red blood cells which contain haemoglobin indicate certain diseases. It is responsible for the yellow colour of bruises and the yellow discoloration in jaundice. It is also responsible for the brown

colour of faeces, via its conversion to stercobilin, and the background/strew-yellow color of urine via its breakdown product. It has also been found in plants [8].

The normal range for bilirubin is 0.3 to 1.9mg/dl for adults and 340µmol/dl for newborn [9].

Factors that affect bilirubin are haemolysis (breakdown) of blood will falsely increase bilirubin levels of lipids in the blood will falsely decrease bilirubin levels [10].

Serum total protein also known as total protein; as a biochemical test for measuring the total amount of protein in serum protein in the plasma is made up of albumin and globulins. These fractions can be quantitated using protein electrophoresis, but the total protein test is a faster and cheaper test that estimates the total of all fractions together [11].

The range for total protein is typically 60-80g/l (it is also sometimes reported as 6.0 – 8.0g/dl) but this may vary depending on the method of analysis.

Factors affecting serum total protein are change in the volume of plasma water and change in the concentration of one or more of the specific proteins in the plasma

Aim and Objectives

The aim of this research work was for the assessment of the effect of terocan on the liver of albino rats by measuring Bilirubin, Albumin, and total protein concentration in albino rats treated with terocan tablet.

MATERIALS AND METHODS

Collection of Biological sample

Twenty-five albino rats were collected from the animal's laboratory of biochemistry department of university of Nigeria Nsukka (UNN) was transferred in steel cages to Ebonyi State University Animal House.

Collection of Drugs

Drug sample (Terocan Tablet) was bought from Godal Pharmacy AbakalikiEbonyi State.

Preparation of Drug Sample

The tablets of Terocan weighing 500mg were put in a beaker and 250ml of distilled water was added to it. The tablets were allowed to dissolve to form a drug solution. The drug solution was stored in a refrigerator.

Animal Treatment and Handling

The animals were grouped into five groups (A-E) each containing 5 albino rats each. The animals were allowed free access to feed and water. They were fed with standard rodent chow (Top feeds).

Measurement of Animal Weight

The weight of the animals were measured on daily basis for seven days using a weighing balance in order to determine the volume of drug solution to be given to the animals.

Administration of Drug Solution

The route of administration adopted was oral. Doses of 7.71, 15.42, 30.84, and 46.26mg/kg body weight respectively were given to the animals and the animals in group E served as the control. The administration was done orally and it lasted for 7 consecutive days.

Collection of Blood Sample from the Animals

After treatment, the animals were starved overnight and sacrificed under mild anesthesia using chloroform and the blood samples was collected using a sterilized specimens bottles free from anti-coagulant and the bottles were well labeled for each animal.

Preparation of Serum

About 3ml of blood was collected from the animal (albino rat) in sterile specimen bottle and allowed to cloth. It was centrifuge at 3000rpm for 5minutes and the serum separated from the plasma with the aid of a plastic pipette dropper.

Measurement of Parameters

Determination of albumin concentration

Albumin concentration was measured using the Bromocresol green (BCG) binding method which is recommended colorimetric technique [12].

Determination of bilirubin

Method

Total bilirubin was measured by the 2,5-dichlorophenyldiazonium (DPD) method and direct bilirubin is often measured by the method of[13].

Total Protein Determination

Total protein determination was measured using Lowry (1951) method [14].

Statistical Analysis

Statistical differences between the mean was analyzed by ANOVA. Resulting data were represented as mean standard deviation.

RESULTS

Physical Observation

During the seven days of administration, the animals treated with Terocan(R)(antimalarial) drug solution produced a general decreased in physical activities, e.g. sluggishness, while the animals used as control did not show any change in physical activities. Also there was a decreased in the feed intake of the rats treated with the drug.

Changes in the Weight of the Rat during the Seven Days of Treatment

Table 1: Changes in the average weight of the rats during 7 days treatment

Days	Group A	Group B	Group C	Group D	Group E
1	124.34±4.66	140.24±6.32	144.04±1.20	128.14±1.22	108.14±5.80
2	112.30±3.35	132.28±5.18	136.04±6.19	136.08±7.33	120.14±5.63
3	108.20±3.35	128.3±6.61	112.24±6.03	112.10±7.35	104.14±6.21
4	89.08±3.39	113.04±6.02	128.04±7.05	107.74±6.24	97.10±4.44
5	90.10±4.19	122.17±6.85	128.04±6.27	109.14±6.29	117.10±7.15
6	112.90±3.43	120.44±6.37	123.66±6.45	115.70±7.08	119.14±7.09
7	103.18±3.97	115.08±6.19	117.14±6.25	112.24±5.80	128.14±6.58

values are mean ± standard deviation (S.D), n=5

LEGEND

- Group A: 7.71mg/kg body weight of the drug solution
- Group B: 15.42mg/kg body weight of the drug solution
- Group C: 30.84mg/kg body weight of drug solution
- Group D: 46.26mg/kg body weight of drug solution
- Group E: Rats in this group were given with distilled water (control).

Levels of albumin (mg/dl) bilirubin (mg/dl) and total protein levels (mg/dl).

Table 2:Levels of albumin mg/dl bilirubin (mg/dl) and total protein levels (mg/dl).

Animal groups	Bilirubin (mg/dl)	Albumin (mg/dl)	Totalprotein(mg/dl)
A	1.44±1.79	4.22±3.07	0.61±0.23
B	1.76±1.98	3.75±2.89	0.53±0.21
C	2.25±2.24	3.21±2.68	0.49±0.13
D	2.88±2.51	2.56±2.39	0.40±0.16
E	1.23±1.66	5.05±3.42	0.73±0.17

Values are expressed as mean ± standard deviation; N = 5.

The average levels of bilirubin in groups A, B, C and D were found to be higher ($P>0.05$) than the average levels of bilirubin in group E, after seven days of administration of drug solution. The average levels of albumin in groups A, B, C and D were found to be significantly lower ($P<0.05$) than the average levels of albumin in group E. The average levels of total protein in groups A, B, C and D were found to be significantly lower ($P<0.05$) than the average levels of total protein in group E.

DISCUSSION AND CONCLUSION

Discussion

In the course of administration of the drug solution, the treated animals showed a decrease in physical activities, feed and water intake compared with the control. The actual biochemical reason responsible for observed decrease is as a result of metabolic response of the animal to the drug, which could lead to loss of appetite. The work of [15], observed that some anti-malaria drugs influence various body processes of animals.

The body weight of the animals treated with terocan significantly decreased ($P<0.05$) when compared to the control group. This could be due to the reported decrease in feed and water intake. The result of the body weight is consistent with the report of [16].

The significant increase ($p<0.05$) in bilirubin concentration and significant decrease in concentrations of albumin and total protein in the animals administered with drug suggest that the drug may be toxic to the liver. Many diseases of the liver are accompanied by jaundice, a yellowing of the eyes and skin, caused by increased level of bilirubin in the system. Bilirubin accumulates from the breakdown of haemoglobin present in red blood cells. Proteins are synthesized the liver. Liver diseases or damage cause decrease in liver functions.

Conclusion

From the result of this work,terocan(R) an anti-malaria administered to the test groups resulted to an increase in bilirubin and decrease in albumin and total protein. This indicates that terocan(R) tablet could be toxic to the hepatocytes, and may not be recommended for a patient with liver disorder.

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