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# Histological and Haemostatic Activities of Aqueous Extract of Aloe Vera in the Liver Cells of Male Albino Wistar Rats

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**ABSTRACT**

**Plant extracts have been found to be very useful for purposes of treatment of diseases among other benefits. Aloe vera is one of such plants whose histological and haemopoietic effect on albino wistar rats were studied. Thirty (30) male wistar rats weighing 140-180g were used for the study. Results showed that extract of Aloe vera had negative effect in the haemopoietic system. The extract reduced the haemoglobin concentration, packed cell volume, white blood cell count and platelet count in test rats (P<0.05). There was increase in the percentage neutrophils.**

**The histological result of the liver cells showed distortions of the liver cyto architecture. It could be deduced from this study that Aloe vera extracts contains some principles that is not favourable to the haemopoietic system and liver cells.**

## INTRODUCTION

Aloe vera is a member of the lily family. It is very cactus- like in appearance and a popular house plant. It is known throughout the world where it grows naturally as the "First- Aid plant", "The Burn plant", "The Miracle plant", "The Medicine plant", "Lily of the desert plant", and the "Plant of Immortality". (Kapica 1998).

Aloe vera contains a large number of nutrients including Vitamins E, C, $B_1$, $B_2$, $B_3$, and $B_6$ as well as iron, manganese, calcium, zinc, amino acids fatty acids, 96% water, essential oil, minerals, enzymes and glycoprotein. The plant can be separated into two basic products: Gel and the Latex (Kapica et al, 1998).

Aloe vera gel is the leaf pulp or mucilage, a thin clear jelly- like substance obtained from the parenchymal tissue that makes up the inner portion of the leaves. It contains carbohydrates, polymers such as glucomannams or pectic acid as well as various other organic and inorganic compounds. Aloe vera Latex contains anthraquinone glycosides, aloins A and B which are potent laxatives. Aloe vera is known for use as external application to the skin, aloe juice is now used to alleviate a variety of conditions of the digestive tract.

Aloe vera is a stimulant to the immune system. It has a powerful anti-inflammatory activity, analgesic properties and is able to speed up cell growth. Repairing damaged tissue by regenerating cells, a function at which Aloe vera has been shown to be most successful (Ode, 1991) where it does not only relieve the painful symptoms but also helps to disperse damaged tissue.

The histological and haemopoietic activities of the aqueous extract of Aloe vera in the liver cells of male albino wistar rats was studied with the aim of knowing the activity of Aloe vera extract on haemopoiesis, its effect on the liver cells, its effect on haemoglobin concentration, white blood cell count and platelet count.

Haemopoiesis means the production of blood cells. In the fetus, all the blood cells develop from cells having their origin in the mesenchyme- the embryonic connective tissue. Haemopoiesis begins in the bone marrow in the third month and from the fifth month until term, the marrow progressively takes over from the liver (Oguwike, 2013). During the first two months of fetal life, blood formation takes place in the yolk sac. The liver then becomes the main site of haemopoiesis until about the seventh month when the marrow takes over. It progressively becomes the major site of blood formation such as the red blood cell, white blood cell and platelets.

The liver is the largest gland in the body. It weighs approximately 1500g and receives about 1500ml of blood per minutes (Chummy, 2011). The wedge shaped organ occupies most of the right hypochondrium and epigastrium.

The liver plays an important role in the formation and destruction of red cells. It is a site for red cell formation in the fetal life. It removes from the blood bilirubin formed when the red cells are broken down and excretes this bilirubin down the bile duct into the duodenum.

The liver also forms a large portion of the blood substances utilized in the coagulation process such as fibrinogen, prothrombin, accelerator globulin etc. The liver also stores vitamins such as Vit. A and $B_{12}$. It also stores Iron in form of ferritin.

## MATERIALS AND METHODS:

### Animals:

The albino wistar rats were randomly selected and kept in animal house in wire mesh cages under standard conditions (temperature 25-30$^0$c), 12hr light and 12hr darkness cycle, with free access to food and water ad libitum. They were stabilized for two weeks before being used for the research study.

### Experimental Design:

Thirty (30) male albino wistar rats weighing 140-180g were randomly selected and divided into two (2) groups. Each group had a similar body weight. Rats in group A (n=15) served as the control while group B rats (n=15) served as the experimental or test animals. The test rats and control rats were fed normal rat pellets and water ad libitum except that in addition to rat feed, the test rats received oral administration of 5mg/g once daily of the leaves extract of Aloe vera.

### Preparation of Extracts:

Fresh pulp of Aloe vera was collected, washed, cut and blended using mortar and a pestle (Samuelson et al, 1992). After maceration, it was filtered out using Whatman no. 1 filter paper. The extract was dried by evaporation giving a yield of 0.5g. The dried extract as dissolved in 1000ml of sterile water to give the concentration used for the study.

### Phytochemical Analysis of Leaves of Extract.

The leaves of the plant were screened for the presence or absence of various secondary metabolites using standard phytochemical screening procedures as described by Habournes (1973), and Trease and Evans (1996) respectively. The extract was tested for tannins, reducing sugars, calcium, saponins, acidic compounds, resins, fats and oil, carbohydrates and steroid.

### Toxicity Studies:

The $LD_{50}$ of the extract in albino rats was determined using Lorke's method (1983). The procedure of determining the lethal dose is by increasing the concentration of the extracts administered into the rats (per body weight) in each group of eight (8) rats for five

(5) days. The doses used were 1000mg/kg, 1500mg/kg, 2000mg/kg, 2500mg/kg, 3000mg/kg, 4000mg/kg, 4500m/kg and 5000mg/kg. The mortality rate was determined after 18hrs and analyzed graphically.

**Haemopoietic Studies:**

Haemoglobin estimation was determined by the method described by Alexander and Griffiths (1993). The packed cell volume estimation was done by the simple method of micro-haematocrit centrifugation Baker (1985). The total white blood cell count and differentials were also determined by method of Baker (1985). The platelet count estimation was done as described by Brecher and Cronkite (1950).

**Histological Study:**

The extracted liver tissues were preserved in formalin. They were later sent to histopathology lab where they were sectioned and stained with Haematoxylin and Eosin solution (H/E staining) as described by Baker, 1985.

**Statistical Analysis:**

The results obtained in this study were presented as mean and standard deviation (Mean ± S.D) and the analysis was done using students' test to determine the level of significance.

## RESULTS

**Table 1: Shows the phytochemical analysis of Aloe vera.**

| **Constituents of Aloe vera.** | | | | | |
|---|---|---|---|---|---|
| | Alkaloids | Glycosides, Flavenoids, Saponins. | Carbohydrate | Reducing sugar, Calcium | Terpenoids, Resins, Steroids, Fats & Oil, Tannins, Acidic compound. |
| **Degree of concentration** | ++ | + | +++ | ++ | - |

Key: - (Negative) + (Present in small concentration) ++ (Present in moderate concentration, +++ (Present in large concentration).

**Table 2: Shows haematological indices of albino wistar rats before the administration of Aloe vera extracts and 28 days after the feeding on extract.**

| **EXTRACTS** | **Hbg/dl ± S.D** | **PCV (%) ± S.D** | **Platelets x $10^9$/$mm^3$ ± S.D** | **WBC x $10^3$/$mm^3$ ± S.D** | **N% ± S.D** | **L% ± S.D** | **E% ± S.D** | **M% ± S.D** | **B% ± S.D** |
|---|---|---|---|---|---|---|---|---|---|
| **Control rats n=15, Extract free** | 12.0± 0.3 | 36.1± 0.6 | 140 ± 30 | 5,000± 23 | 61 ± 2 | 36± 4 | 2 ± 0.2 | 1 ± 0.5 | 0 ± 0 |
| **Day 1 before extract feed.** | 12.5± 0.5 | 37.5± 1.0 | 154 ± 45 | 5,300 ± 30 | 59± 1.0 | 38± 0.4 | 2± 0.5 | 1 ± 0.2 | 0 ± 0 |
| **Test rats 28 days after Aloe vera feed n=15** | 7.2 ± 0.4 | 21.6 ± 0.6 | 92 ±10 | 2,900 ±40 | 72± 0.6 | 26± 0.2 | 1.0 ± 0.2 | 1.0 ± 0.0 | 0 ± 0 |
| **Level of Significance** | P<0.05 | P<0.05 | P<0.05 | P<0.05 | P<0.05 | P<0.05 | P>0.05 | P>0.05 | P>0.05 |

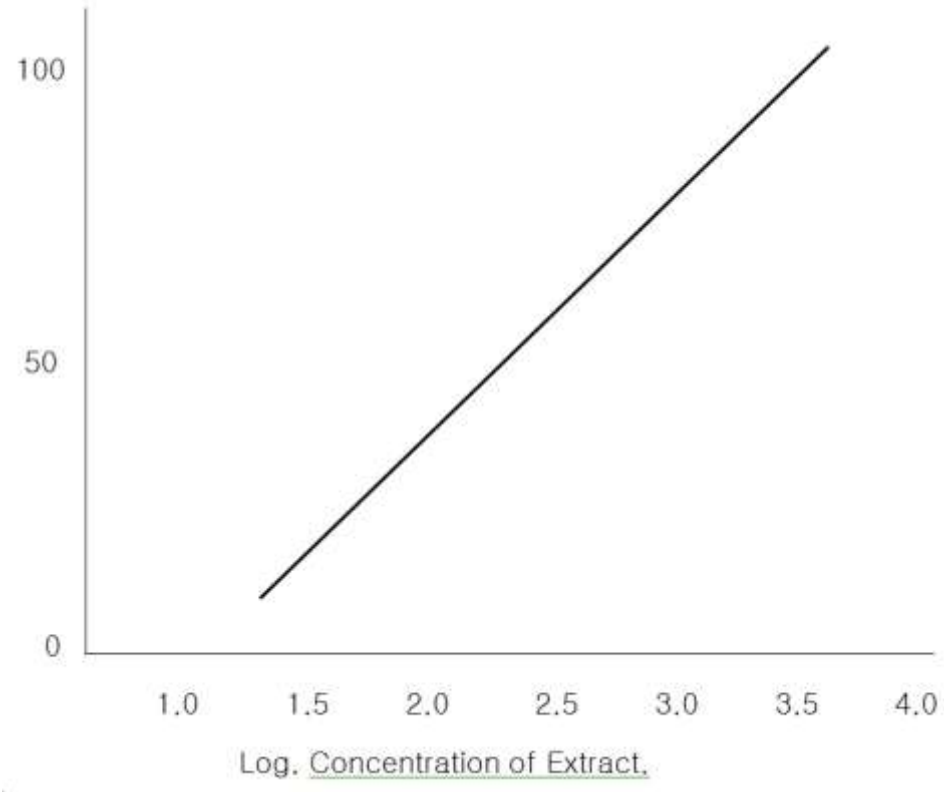


**Fig 1: Shows lethality study of rats on aqueous extract of Aloe vera**

## DISCUSSION

This study has been able to look into the histological and haemopoietic activities of aqueous extract of Aloe vera in the liver cells of male albino wistar rats.

The phytochemical analysis show the presence of typical plant constituents (Okoli et al, 2007) such as flavonoids, alkaloids, calcium, saponins, carbohydrate, reducing sugar and glycosides while other constituents such as tannins, resins, terpenoids, acidic compounds, steroids, fat and oils were absent.

The acute toxicity study showed that the Aloe vera extract was nontoxic as indicated in the $LD_{50}$ (Figure 1) as 2500mg/g. The dose used in this study (5mg/g) was far lower than the lethal dose and so was considered safe for use throughout the study.

On the haemopoietic study, the mean value of packed cell volume and haemoglobin concentration in control and test rats showed a decrease ($P<0.05$), thus suggesting possible inhibitory effect on erythropoiesis.

The reported decrease in haemoglobin concentration in rats fed with Aloe vera was below the mean reported by early workers (Iwu, 1983) showing that the consumption of Aloe vera for other various purposes could predispose one to anemia in the users. There was also a marked decrease in white blood cell count, platelet count and neutrophil count in rats fed with extracts of Aloe vera (Table 2). The leukocytopenia observed could be physiological resulting from stimuli (Dacie, 1984) that include taking in of Aloe vera extract that is very bitter.

Examination of liver cells demonstrated mild liver cell damage causing distortion of the liver cyto architecture in the test rats while the control rats had normal liver cell cyto architecture. The liver plays a very important role in the formation and destruction of red blood cells hence any substance that affects it negatively will definitely cause reduction in red blood cell production.

It could be concluded from this study that Aloe vera extract has negative effect in the haemopoietic system of rats.

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