



Hepatotoxicity of Gudomi (Herbal Concoction) on Liver Function Enzymes in Wistar Rats Fed with Protein Rich Diet

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Abstract-This research was carried out to determine the extent of Hepatotoxicity of Gudomi on Wistar Rats fed with protein rich diet. Gudomi is a drug widely used to treat toothaches, measles mostly in children, but it has serious adverse effect including hepatotoxicity and teratogenicity. Twenty-five Wistar Rats were used. The Rats were weighed and grouped into five or five rats in DIY cage, that is, group 1 (100% Gudomi), group 2 (70% Gudomi), group 3 (50% Gudomi), group 4 (30% Gudomi) and group 5 (Control) and they were fed with protein rich diets for a period of four weeks. The rats were then starved overnight and the groups 1, 2, 3, 4 rats were orally administered for fourteen days. The research showed that the rats fed with protein rich diet and Gudomi has recorded a significant increase in AST (Aspartate amino transferase). ALT (Alanine amino transferase) and ALP (Alkaline phosphatase) in comparison with the rats that were fed with protein rich diet and water. Oral administration of Gudomi to the Wistar Rats led to a degree of liver injury.

Key words: Antimicrobial, Antifungal, Authelmintic, Insecticidal, Gudomi, Metabolism.

1.0 Introduction

Traditional Herbal Medicine (GUDOMI) known as folk medicine comprises of medical aspects of traditional knowledge that developed over generations within various societies before the era of modern medicine. According to WHO; traditional medicine as the sum total of the knowledge, skills and practices based on the theories, beliefs and experience indigenous to different cultures, whether explicable or not used in the maintenance of health as well as in the prevention, improvement or treatment of physical and mental illness.

Large number of medicine made from several medicinal plant constituents such as *Gudomi* have been shown to be associated with antimicrobial, antifungal, authelmintic, insecticidal and other activity, because that many families of plant used in preparation of this drugs are considering as traditional herbal remedies which are able to remedy many diseases. However, many cases of poisoning by plant occur from over dosage because of absence of standardized dosage system in herbal medicine for instance *Gudomi*.

Gudomi is widely distributed in various regions of Nigeria and it comprises of several combination of plants such as Ewe taba (*Nicotianatubacum*), alubosaelewe (*Allium ascalonicum*), potash, sugarcane (*saccharumofficinarum*), Obuotoyo, egboaagbarin , etuibonto mention few. Also, liquid content of this drug include urination of female cow in which all other materials were soaked in for several days, this does not involve heating and addition of water. The liver is the largest and one of the most complex internal organs in the body. It plays an important role in the maintenance of internal environment through its multiple and a diverse function, liver is involved in several functions such as metabolism, secretion and storage. This study involved acclimatization, intubation, sacrificing of the experimental organisms

(Wistar Rats) and subsequently various blood analyses were carried out on the serum samples collected to determine the toxicity of the administered constituent of Gudomi.

Finally, the use of herbal therapy may be complicated by several indirect adverse effects people initially consulting herbal practitioners may suffer from false diagnosis and consequent delay in obtaining effective conventional treatment. Others may delay foregoing appropriate conventional options in favour of ineffective unconventional ones. When expectations of alternative therapy are high, failure to obtain reliefs from symptoms, particularly if treatment has been expensive, could also be construed as an adverse effect. The aim of this study was mainly to understand the procedure necessary in carryout toxicity experiment using albino rats, and understand series of blood analysis to determine toxicity in blood.

2.0 Methodology

2.1 Reagents and Equipment's

Reagents: Chloroform, Gudomi, Distilled water, Sodium Hydroxide

Equipment: Incubator, Dissecting kits, DIY cages, Hand glove, Needle and syringe, Conical flasks, Lithium heparin bottle, Cotton wool, Electronic scale ALT kits, AST kits, ALP kits, Water bath, Centrifuge, Spectrophotometer

2.2 Experimental Design

Twenty-five Wistar Rats were obtained from Animal Care Laboratory, ObafemiAwolowo University, Ile-Ife, Osun State. The rats were maintained in a twelve hours dark and light cycle and they were allowed to acclimatize to their surrounding weather condition for two weeks and they were given free access to feed and clean water.

2.3 Animal Handling

The animal house, where the research work is to be carried out was cleaned thoroughly with soap, water and broom, so as to get rid of any unwanted contaminant that is injurious to the health of the Albino Rats, and ensuring dust free environment in the animal house to ensure proper ventilation.

The Albino Rats selected for this project study are in the weight range of 130.00g – 245.00g placed inside the animal house in a controlled environment for air and temperature with free access to water and feeds. The White Wistar Rats were left for two weeks for acclimatization so that they can become adopted and become familiar with their environments.

2.4 Housing of The Rats

There are several different types of accommodation available for rats, each type has merits and demerits, any type of housing that is to be used for rats needs to allow them to sleep in peace. As endorsed by the Human Society of the United States 2011, the following house can be used for animals. Aquarium Wire Cage, hutches DIY cages, aviaries and ferret cages DIY (Do it Yourself Cage) was used by creating a rectangular hole on the cover of the plastic and a wire net was used to cover the hole and a flexible wire was used to tightening the cover and the net together and saw dust was placed inside the bed of the cage as bedding for the Wistar Rats and it was five DIY cages was created.

2.5 Grouping of The Wistar Rats

The white wistar rats were weighed using electronic scale balance of high precision and accuracy of 0.00 and they were divided into five groups of five rats in a cage according to their body weight.

2.6 Dosage Calculation

This process involves the calculation and determination of the amounts of Gudomi and distilled water to be diluted and administered orally into the White Wistar Rats Selected for the study.

2.7 Sample Preparations

Concentrations of the Gudomi solutions to be administered into the Wistar Rats were prepared in volume per volume and are denoted in percentages, these are shown in the results below.

2.8 Administration of The Sample

A syringe mouthed with Cannula of 3ml was used to draw varied ml from the varied Gudomi concentrated Solutions prepared and was administered orally by using Cannula for the White Wistar Rats in each Group as the case may be for fourteen days in 24 hours' interval of time (10:00am daily).

2.9 Blood Sample Collection

A little amount of chloroform solution was soaked with cotton wool and was put inside an empty cylindrical can of tin-tomato. All the Wistar Rats was taken from each group, the Wistar was put inside the tin-tomatoes-can and was covered with glass for suffocation process and the animal was sacrificed by pinning the four legs of the rats to the table and a pair of scissors was used to cut the flesh of the Wistar Rats.

The blood of the rats was collected using a 5ml syringe by drawing the blood from the liver organ of the Wistar and was transferred into the Lithium Heparin bottle. The blood was centrifuged at 3000rpm for 5minutes for Serum Separation. The Serum was decanted and stored at - 40°C for various parameters of Liver function tests to be analyzed in the Diagnostic Laboratory.

2.10 Estimation of Liver Function Enzymes

The following liver function enzymes were estimated using mostly blood sample of wistar rats (serum): Alanine aminotransferase (ALT), ASPARTATE AMINOTRANSFERASE CAST, ALKALINE PHOSPHATASE (ALP), ALBUMIN, TOTAL PROTEIN, TOTAL BILIRUBIN, and CONJUGATED BILIRUBIN

3.0 Results and Discussions

3.1 Results

Table 1: The body weights of the Wistar Rats **before** Gudomi's were administered orally.

Groups	1st Rats	2nd Rats	3rd Rats	4th Rats	5th Rats	Mean Weight
One (g)	240.00	201.00	207.00	200.00	209.00	211.40
Two (g)	172.00	180.00	170.00	180.00	171.00	174.60
Three (g)	163.00	158.00	163.00	160.00	160.00	160.80
Four (g)	140.00	155.00	144.00	140.00	143.00	144.40
Five (g)	135.00	139.00	133.00	138.00	139.00	136.40

The Mean Weight of each group is denoted as MW

Table 2: The body weight of the Wistar Rats **after** Gudomi's were administered orally

Groups	1st Rats	2nd Rats	3rd Rats	4th Rats	5th Rats	Mean Weight
One (g)	245.00	208.00	215.00	210.00	220.00	219.60
Two (g)	174.00	183.00	175.00	184.00	176.00	178.40
Three (g)	164.00	157.00	165.00	162.00	159.00	161.40
Four (g)	141.00	156.00	143.00	142.00	144.00	145.20
Five (g)	136.00	140.00	134.00	140.00	136.00	137.20

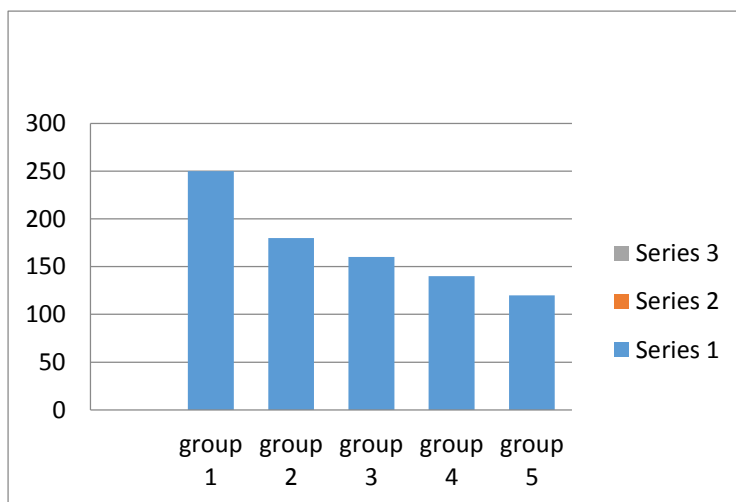


Fig 1. The mean weight of the rats before administration

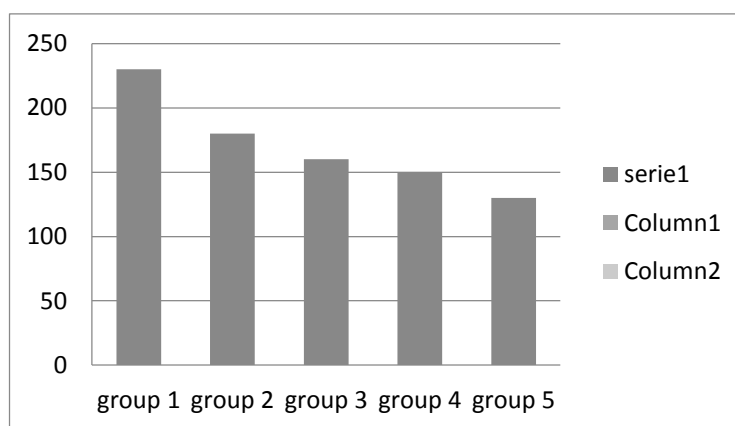


Fig 2. The mean weight of the rats after administration

Table 3. Group One: The Wistar Rats orally administered with 100% Gudomi's Solution.

Number of Rats	ALT	AST	ALP	TPE	TB	CB	AE
G ₁	7	11	16	82	10	9	44
G ₂	10	17	19	75	15	44	40
G ₃	8	13	20	78	11	10	41
G ₄	10	16	17	80	14	43	42
G ₅	7	17	19	76	13	42	44

Where G = Gudomi's Administered Group Serum sample

The values are in millimole per litre (mmol/L)

ALT = Alanine amino transferase Test, AST = Aspartate amino transferase Test
 ALP = Alkaline Phosphates Test, TPE = Total Protein Estimation Test
 TB = Total Bilirubin Test, CB = Conjugated Bilirubin Test
 AE = Albumin Estimation Test

Table 4. Group Two: The Wistar Rats orally administered with 70% Gudomi's Solution.

Number of Rats	ALT	AST	ALP	TPE	TB	CB	AE
G ₁	5	15	9	67	16	27	44
G ₂	10	17	14	73	16	61	35
G ₃	6	16	10	70	15	28	43
G ₄	6	17	9	72	15	60	40
G ₅	9	15	13	69	17	62	38

Table 5. Group Three: The Wistar Rats orally administered with 50% Gudomi's Solution.

Number of Rats	ALT	AST	ALP	TPE	TB	CB	AE
G ₁	8	11	13	79	13	86	49
G ₂	7	12	11	77	13	85	47
G ₃	8	10	10	81	14	87	50
G ₄	8	11	12	80	12	86	49
G ₅	7	12	13	79	12	85	49

Table 6. Group Four: The Wistar Rats orally administered with 30% Gudomi's Solution.

Number of Rats	ALT	AST	ALP	TPE	TB	CB	AE
G ₁	5	15	9	67	16	27	44
G ₂	10	17	14	73	16	61	35
G ₃	6	16	10	70	15	28	43
G ₄	6	17	9	72	15	60	40
G ₅	9	15	13	69	17	62	38

Table 7. Group Five: Control Group, the Wistar Rats orally administered with 100% Water Solution.

Number of Rats	ALT	AST	ALP	TPE	TB	CB	AE
C ₁	7	18	18	79	10	05	39
C ₂	2	8	12	52	12	46	45
C ₃	7	17	19	80	10	45	40
C ₄	3	19	17	65	11	40	42
C ₅	4	10	14	53	12	48	44

3.1 Control of The Results

AST TEST: The value obtained for the concentration of Aspartate Aminotransferase enzymes in the normal living organism body like human being should fall within the specified range of serum up to 12 μ /l.

ALT TEST: The value obtained for the concentration of Alanine Aminotransferase enzymes in the normal living organisms body like human being should fall within the specified range of serum up to 22 μ /l.

TB TEST: The value obtained for the concentration of total bilirubin enzymes in the normal living organism's body especially human being should fall within the specified range of serum up to 20 μ /l.

AE TEST: The value obtained for the concentration of the albumin enzymes in the normal living organisms body especially human being should fall within the specified range of serum between 35 – 50mmol/L.

PE TEST: The value obtained for the concentration of the protein enzymes in the normal living organisms body especially human being should fall within the specified range of serum between 58 - 80 μ /L.

CB TEST: The value obtained for the concentration of the conjugated bilirubin enzymes in the normal living organism's body especially human being should fall within the specified range of serum up to 5 μ /L.

ALP TEST: The value obtained for the concentration of the Alkaline phosphates enzymes in the normal living organisms body especially human being should fall within the specified range of serum between 12 - 17 μ /L.

3.2 Diagnostic Aspect of the Results

The result of the experiment showed that the animals (Rats) administered with raw Gudomi (100% Gudomi) has been diagnosed to have liver disease that is stereotypically linked to the local gin, Gudomi, it causes various forms of liver diseases like Cirrhosis a condition that results from permanent damage or scarring of the liver, it may the end stage of many different forms of liver disease and is known to cause a number of other health problems including variceal bleeding, ascities and hepatic encephalopathy.

The 100% Gudomi/Wistar Rats also developed viral hepatitis caused by viruses that attack the liver and also Fatty Liver disease linked to obesity and also Liver Cancer disease due to the high concentration of Gudomi.

When compared with the control group (100% distilled water) shows a normal concentration of liver functioning enzymes which indicates that the Wistar Rats is healthy and free of any forms of liver disease.

The 70% Gudomi/Wistar Rats shows a normal concentration of liver functioning enzymes due to the dilution of the Gudomi with distilled water which indicates that the Wistar Rats is healthy and free of any forms of liver disease.

The 50% Gudomi/Wistar Rats shows a normal concentration of liver functioning enzymes due to the dilution of the Gudomi with distilled water which indicates that the Wistar Rats is healthy and free of any forms of liver disease.

The 30% Gudomi/Wistar Rats shows a normal concentration of liver functioning enzymes due to the dilution of the Gudomi with distilled water which indicates that the Wistar Rats is free of any forms of liver disease and healthy.

3.3 Discussion of The Mean Weight

From the calculated mean weight of each group in table 1-2 and figures 1-2 of the mean weight before and after the administration processes indicated Wistar Rats gain weights which shows that physically they are in healthy condition.

3.4 Discussion of The Results In this present study, all the Wistar Rats that were fed with protein rich diet had recorded a significant increase in their body weight after experimental feeding before and after the administration process.

This view was supported by Maomyte et al. (2010) who reported that Wistar Rats or any laboratory rodents fed with protein enriched diet prone to develop more weight, have higher liver function enzymes levels and showed less efficient, liver function enzymes disease.

Also, the result of this study revealed that Wistar Rats administered with raw Gudomi Solution (100%) had recorded a significant decrease in serum aminotransferase that is, liver function enzymes in blood had decrease as compared with group one rats that were not treated with Gudomi solution. This was supported by Emmanuel, 2009 who reported that orally administration of Gudomi is associated with mild elevation of liver enzymes. However, hepatotoxicity induced by Gudomi might be as a result of the conversion process of Gudomi to reactive toxic metabolites or induction of immune allergic reactions, as presented in Table 3-7 of this report.

4.0 Conclusion

It can be concluded from this study that the raw Gudomi solution increased the effect of liver damage of the Wistar Rats of the tested groups 1 (i.e 100% gudomis) while the diluted Gudomi solution in group two (70%Gudomis), group three (50% Gudomis) and group four (30% Gudomis) have reduced the effect of liver damage of the Wistar Rats compared to the control group (100% distilled water).

The oral administration of Gudomi solution have proven clinically to reduced and healed diseases like measles and It can also be concluded from the histological examination that there was liver damage to rats in group 1 and 2.

- The Gudomi drug should be taken by the people suffering from measles and other worm diseases. Not to be taken by a healthy people.
- It is recommended that the government should provide a tremendous assistance to the local medicine procedures in controlling the concentration of their local drugs which will have minimal side effect and that would be effective for treatment of worm disease.
- Pregnant women should be very careful and avoid the use of this herbal concoction as this can cause birth defect and may lower the children intelligence Quotient (IQ).
- This research work should be continuing in a multilevel analysis in order to elucidate the Hepatotoxicity effects of Gudomis that are yet to be discovered.
- Due to an increased risk for the liver problems, people with certain inherited metabolism disorder such as (Alpers – Hu Henlocher Syndromes) should not use this medication.

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APPENDIX

Formula for calculating total protein estimation.

$$\frac{\text{OD of test X Concentration of Std}}{\text{OD of Std}}$$

Formula for calculating Albumin estimation.

$$\frac{\text{OD of test X Concentration Standard}}{\text{OD of Standard}}$$

Formula for calculating Mean Variance and Standard Variation.

Mean

$$i. \quad \bar{X} = \frac{\sum x}{n}$$

Where \bar{X} = mean observation

$\sum x$ = summation of the all observation

n = number of subjects observed

ii. Variance

$$V = \frac{\sum (d)^2}{n}$$

V = Variance

d = deviation

$$\sum(d)^2 = \text{summation of square of all deviation}$$

n = number of rats observed

iii. Standard Deviation

$$\sqrt{\frac{\sum(d)^2}{n}}$$

Where:

$$\sum(d)^2 = \text{summation of square of deviation}$$

n = number of rats observed