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EFFECT OF ORAL ADMNISTRATION OF AQUEOUS LEAVES EXTACT OF *CASSIA OCCIDENTALIS* ON LIVER AND KIDNEY FUNCTIONS IN RATS

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ABSTRACT
The toxicological effect of aqueous leaf extract of Cassia occidentalis Linn plant in rats was studied. Serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), urea and creatinine were measured 14 days after oral administration. No significant rise (P>0.05) in activity of ALT, AST, ALP and the concentrations of urea and creatinine were recorded at the 300, 600, and 900mg/kg body weight doses administered. Histopathological analysis revealed no cellular death, necrosis or inflammation of the liver and kidney. The leaves of this plant are thus found to be safe with no adverse effect on the liver and kidney functions at the doses administered.
Keywords: - Cassia Occidentalis, Toxicological effect, Aminotransferase, Histopathology

INTRODUCTION

A medicinal plant has been described as a plant with one or more of its organs containing substances that can be used for therapeutic purposes or which precursors are used for the synthesis of drugs (Lewis, 1981).

Tropical forest incidentally represents major sources of medicinal plants. The medicinal properties of plants are mainly attributed to the presence of various simple and complex organic compounds present in them. These compounds are metabolite like alkaloids, flavonoids, phenols, tannins, saponins etc (Subbram, 1997).

Most of the herbs used in treating various diseases are used indiscriminately. This attract the interest of many researchers in science and medicine to undertake researches that will significantly unfold the medical importance, mechanism of action as well as toxic effect (if any) of these medicinal plants (Akinsanya,1973).

Cassia Occidentalis Linn also known as *Senna occidentalis* or *coffee Senna* is a small tree that grows 5-8m high and is found in many tropical areas of south America, including warmer climate and tropical areas of south, central and north America. It seeds found in long seed pods are roasted and made into coffee-like beverage (Bardhan, 1985). Invivo studies of aqueous leaves extract of *Cassia occidentalis Linn* have demonstrated an anti-inflammatory, hypotensive, smooth muscles relaxant, antispasmodic, weak uterine stimulant, vasoconstrictor and antioxidant activities in laboratory animals (Bardhan,1985). Toxicological studies of the aerial part, leaves and roots (mostly organic extract) of *Cassia Occidentalis Linn* (*fedegoso*) have been published by several research groups (Bardhan, 1985).

The organs mostly affected by toxins from medicinal plants include Liver, heart and kidney. The effect on these organs can be evaluated by determining the activities of enzymes specific to these organs in serum. Presence of the enzymes specific to these organs is a good indicator of damage to these organs (Zilva and Pannal, 1975). Indiscriminate usage of *C. occidentalis* leaves in treatment of diseases in Nigeria and many other countries justify carrying this research and many of its kind.

Most medicinal plants used by people are almost always taken in aqueous form either dissolved in cold water or boiled in water and not in organic solvent. It was also reported that the aqueous extract is less toxic than the organic extract (Nwangwu *et al*., 2011).Based on this fact, the toxicity of the aqueous extract is aimed at, to ascertain the toxicity and otherwise on our local users.

MATERIALS AND METHODS

Plant Material, Collection and Extraction

Leaves of *Cassia occidentalis Linn* were collected in Lafia Nasarawa state and transported to Kano in polythene bag. They were authenticated at the Botany unit of biological sciences department, Bayero University Kano. The leaves were shade dried and ground into powder. The powder was weighed and suspended in a known volume of distilled water and was allowed to stand for 24hrs.The mixture was filtered, the filtrate was evaporated to dryness in an oven set at 45^0C.The dried extract was kept in a cool dry place which was used throughout the experiment by reconstituting in distilled water a known weight of the dried residue (extract) to obtain the desired concentration.

Experimental Design

For the sub-acute toxicity studies, sixteen (16) adult male wista rats were grouped into four (4) of four (4) rats each.

The first group served as control and was given distilled water orally, while groups II, III and IV were given orally 300mg/kg, 600mg/kg and 900mg/kg body weight of the leaves extract respectively for two (2) weeks. The blood, Liver and kidney of the rats were obtained 24hours after last administration by sacrificing the animals.

Collection of Samples (Serum and Organs)

At the end of the two (2) weeks of oral administration of the aqueous leaf extract of *Cassia Occidentalis*, the rats were slaughtered and blood was collected from their throat into centrifuge tubes.

The blood was allowed to clot at room temperature for about 30mins, after which an applicator stick was used to carefully loosen the blood. The blood was centrifuged at 2500rpm for about 10mins.

A clean Pasteur pipette was used to carefully collect the serum and dispense into a clean labeled specimen bottle. Sera samples collected were analyzed for the activities of *aspartate aminotransferase (AST), alanine aminotransferase, (ALT), alkaline phosphatase (ALP)* and the concentration of urea and Creatinine. The Liver and Kidney were taken to Aminu Kano teaching Hospital (AKTH) for Histopathological analysis.

Serum *aspartate aminotransferase (AST*), *alanine aminotransferase (ALT)* activities were determined by the method of Reitman and Frankel (1957).

Serum Alkaline Phosphatase (ALP) activity was determined by the method of DGKC (1972).

Serum Urea concentration was determined using Urease-bertholot method of Weatherburn, (1967).

Serum creatinine concentration was determined by Jaffe's method of (1886).

The organs (liver and kidney) were fixed in 10% formal saline after dissecting them out (Kiernan, 1981) and taken to the pathology department of Aminu Kano Teaching Hospital (AKTH), where Histopathological analysis was carried out with the assistance of a qualified pathologist. Automated tissue processing was employed.

RESULTS AND DISCUSSION

Table 1: Serum AST, ALT, ALP, Urea and Creatinine in rats administered with 300mg/kg, 600mg/kg and 900mg/kg body weight of *Cassia occidentalis Linn* leaf extract for fourteen (14) days.

Dose (mg/kg)	AST U/L	ALT U/L	ALP U/L	Serum urea mmol/L	Serum Creatinine umol/L
Control	9.25±3.40	11.75±2.87	96.5±35.63	7.28±1.23	60±24
300	12±4.0	13.33±1.16	128.67±41.79	8.07±1.52	48±0
600	11.0±4.16	10.5±4.51	110.25±38.66	8.58±1.27	60±24
900	10.5±3.42	6.25±6.65	158.25±34.77	10.78±2.68	72±27

Number of animals used =16

Values are presented as mean ± Standard Deviation.

Statistical analysis (student t test) revealed no significant difference in all the parameters above.

DISCUSSIONS

The result of the activities of AST,ALT,ALP as well as the concentration of serum urea and creatinine in control rats and those administered with daily oral doses of 300mg/kg,600mg/kg and 900mg/kg body weight of *Cassia occidentalis* leaf extract for fourteen (14) days is shown in Table 1 above.

The AST and ALT levels in control rats are (9.25±3.40 U/L) and (11.75±2.87 U/L) respectively. Oral administration of daily doses of 300mg/kg,600mg/kg and 900mg/kg body weight of the aqueous leaves extract for fourteen days resulted in no significant (P>0.05) increase in the activities of both AST and ALT.

Since higher ALT and AST activities are indicative parameters of liver damage or disorder (Kaplan et al, 1995; Annino and Giese, 1976) the plant may thus be said to have no hepatotoxic effect at the given doses. Which conform with the findings of Nwangwu, et al (2011)

Oral administration of daily doses of 300,600 and 900mg/kg body weight of the aqueous leaf extract of *Cassia occidentalis* for fourteen days showed no significant (P>0.05) increase in the concentration of Serum urea and creatinine.

Those rats that received 300 and 600mg/kg body weight of the aqueous leaves extract have the levels of their ALP as 128.6 ±41.79 and 110.25±38.66 respectively. But rats in the group that received 900 mg/kg body weight of the aqueous leaves extract have their ALP level 158.25±34.77 slightly high (Table 1), although the rise in concentration of ALP is not significant (P>0.05).

This slight rise in the concentration of ALP would have come from the Liver only if other tests such as AST or the more specific liver enzymes ALT and Y- glutamyl tranferase are also high (Kaplan et al, 1995).This indicates that a further analysis should be carried out if the actual source of the rise in activity of the ALP is needed.

There was no significant rise (P>0.05) in concentration of both serum urea and creatinine when compared to their levels in control rats. Both urea and creatinine are by-products of metabolism and are excreted by the kidney through glomerular filtration.

When kidney function is impaired, alteration of its glomerular or tubular function results, leading to accumulation of metabolites that are mainly excreted through the kidney such as urea, uric acid and creatinine (Blumenkrantz et al, 1980).The fact that even 900mg/kg of the aqueous leaves extract for 14 days did not result in significant (P>0.05) increase in the of serum urea and creatinine showed that the dose produced no impairment of renal function.

Although measurement of the plasma or serum Urea concentration is widely regarded as a test of renal function, a number of non renal factors influence the circulating Urea concentration and consequently limits its utility as a test for renal function. For example, Urea production and consequently the Urea concentrations are increased by a high protein diet, increase protein catabolism, muscle wasting (as in starvation), reabsorbtion of blood proteins after a gastro intestinal hemorrhage, treatment with cortisol or its synthetic analogues, in some cases of chronic liver disease and with decrease perfusion of the kidney. The plasma Urea will also depend to a degree on the state of hydration of the patient and dehydration should be considered when the Urea is slightly elevated up to as high as 24mg/dl (9.0mmol/L) and the plasma Creatinine is normal. In all the pre-renal situations the plasma concentration will be normal (Burtis and Ashwood, 1999).The result of the Histopathological analysis of both the kidney and Liver showed no evidence of cellular injury, cell death or inflammation i.e. all the test organs appear normal like the control organs. This result conformed to the enzymes assay which showed no significant rise (P>0.05) in the activities of the enzymes analyzed as well as the concentration of Urea and Creatinine determined.

This further confirmed that the aqueous leaf extract of *cassia occidentalis* is safe at the given doses via oral administration. This conforms with the work of Mires *et al*. (2011)

CONCLUSION

The results in this finding showed that sub acute administration of aqueous leave extract of *Cassia occidentalis* at doses of 300,600 and 900mg/kg body weight is not significantly (P>0.05) toxic in male Wistar rats, suggesting a safety use by humans.

RECOMMENDATIONS

Based on the conflicting idea that the plant is both pharmacologically active as well as toxic to some extent by previous researchers, a lot need to be discovered by scientist on the cost benefit analysis of this plant, by further investigating the pharmacological activity of this plant extract via aqueous cold water percolation method.

A further study on isolation, purification and characterization of the bioactive compounds in the extract is recommended.

The pharmacology as well as the toxicological studies of different methods of extraction is recommended.

The toxicity of various route of exposure e.g. intraperitoneal etc is also recommended.

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