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HISTOPATHOLOGICAL EFFECTS OF PROLONGED CONSUMPTION OF AQUEOUS AND METHANOLIC LEAF EXTRACTS OF JATROPHA TANJORENSIS ON THE LIVER TISSUES OF ALBINO RABBITS.

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ABSTRACT

In order to gain greater insights into the use and importance of plant medicines, a study on the prolonged consumption of Jatropha tanjorensis also commonly known as hospital too far, chaya amongst other names was carried out. Jatropha tanjorensis is native of Mexico and Central America. It is grown in the Southern part of Nigeria and its leaves are used as vegetables and plant medicines. It has been reported to possess ethnomedicinal uses which include its efficacy in the treatment of high blood pressure, anemia, hyperlipidemia, antimicrobial, antimalarial and hematological properties. Albino rabbits weighing 2.8 – 3.00kg were divided into control experimental group I: aqueous leaf extracts group and experimental group II: Methanolic leaf extracts were used.

Control group rabbits were administered 3kg grower's mash feed per 300ml distilled water ad libitum for 90 days. Experimental group I rabbits were administered 3kg grower's mash per 300ml aqueous leaf extracts of Jatropha tanjorensis ad libitum for 90 days. While experimental group II rabbits were administered 3kg growers mash per 300ml methanolic leaf extracts of Jatropha tanjorensis ad libitum for 90 days. The rabbits were "sacrificed" at the end of the experiment and histopathological examinations were carried out. From observations, control group rabbits did not present any histological changes in the liver. Liver tissues of

experimental group I rabbits presented hepatocytes with Micro Vesicular Steatosis (MIST), mild distortions with features of fatty degeneration in the early stages.

Liver tissues of experimental group II rabbits presented grave distortions with localized infiltration of inflammatory cells indicative of a diseased tissue. The aqueous leaf extracts of Jatropha tanjorensis caused milder effects compared to the methanolic leaf extracts which directly suggests that higher toxicity levels occur with methanolic leaf extracts of the plant.

KEYWORDS: Jatropha tanjorensis, ad libitum, liver, aqueous, methanolic, hepatocytes, Micro Vesicular Steatosis.

CHAPTER ONE

INTRODUCTION

BACKGROUND OF STUDY

Vegetables form a major component of foods and are also used for dietary and medicinal sources in Africa. In the southern part of Nigeria, the consumption of vegetables is very common either as food sources of for medicinal reasons. The belief on traditional herbs for medicinal purposes has increased over the years (Duncan et al, 1999). In Nigeria, the practice of consumption of various plants leaves, stems and roots as herbs is on the increase due to strong beliefs that these herbs are cheaper, easier to find and possess the ability to cure a wide array of diseases. This practice is rather being contested due to the way these medicinal herbs are prepared for consumption (UNESCO, 1998).

Medicinal plants also called medicinal herbs have been used in traditional medicine practices from prehistoric times. A medicinal plant is any plant which in one or more of its organs contains substances that can be used for therapeutic purposes or which are precursors; substances that come before and are direct sources of others, for the synthesis of useful drugs.

HERBAL MEDICINE

Herbal medicine is a special kind of traditional medicine where the traditional healer who is called an herbalist, specializes in the use of herbs to treat different ailments.

Herbal medicinal products otherwise called Phyto therapeutic products are medicinal substances whose active ingredients contain exclusively plants, plant parts or materials or combinations in crude or forms that are processed.

TRADITIONAL MEDICINE

Traditional medicine refers to health practices, approaches, knowledge and belief incorporating plants, animals and mineral medicines, exercises, manual techniques and spiritual therapies which are applied alone or in combination to maintain well-being, prevent, diagnose and treat various illness.

Types of Traditional Medicines

Traditional medicines include but are not limited to the following; Traditional Chinese Medicine, Traditional African Medicine, Traditional European Medicine, Traditional Iranian Medicine, Traditional Korean Medicine, Ayurveda, Unani, Medieval Islamic Medicine, Ancient Iranian Medicine, Siddha Medicine, Muti, Ifa etcetera.

Medicinal plants are an effective source of modern and traditional medicine (Monier M Abd – El- Ghani, 2016); people from all continents have used plants to treat various diseases. Medicinal plants demand intensive management with different species requiring their own conditions of cultivation. There are more than 80,000 known medicinal plants that present both preventive and curative properties to several ailments (Horaeau and Da Silva, 1999).

In countries exemplified by China and India, the contribution of traditional medicine is as much as 80% (Wang, 2005). Therefore, the economic importance of medicinal plants is much more to those countries than the rest of the world. These countries provide two-thirds of the plants used in modern systems of medicine and the health care systems of rural populations. According to Monier M Abd El-Ghani, 2016, India alone has more than 12 biodiversity centers with over 45,000 different plant species.

According to the WHO (World Health Organization, 2011) traditional medicine is the sum total of all the knowledge and practices whether explicable or not used in the diagnosis, prevention and elimination of physical, mental or social in balance, it is said to be merging together of dynamic medical knowledge and ancestral experience.

WHO (2000), posits that more than 80% of the world's population use herbal medicine for the treatment of their sicknesses.

In Africa, traditional medicine made form plants have played significant roles in the health of millions of people and is said to make up the first line of treatment for 80% of children with different diseases (WHO, 2001). Traditional medicine has been described by the World Health Organization as one of the surest means of achieving the total health care coverage of the world's population.

In China, Traditional Chinese Medicine (TCM) is recognized as a complete medical system that has been used to diagnose, treat and prevent illnesses and has been in use for more than 2000 years.

Even in developed countries such as United States of America, plant drugs make up as much as 25% of the total drugs used for treatment purposes.

In India where Ayurvedic medicine has been practiced for many years, herbal medicine (remedies) basically use plant based ingredients to treat ailments.

It is worthy of note that plants and plant products have been used as sources of remedies for the treatment of many diseases for centuries by different people. According to Borris, 1996, over 25,000 higher plant species on earth have been identified as medicinal plants (herbs). Knowledge of medicinal plants by indigenous cultures is also important for conservation of cultural traditions.

Plant medicines are in wide use around the world in most of the developing world especially in rural areas, local traditional medicine is the only source of health care for people.

Drugs derived from plants including opiates, cocaine and cannabis are potent for medicinal and recreational purposes. According the world health organization (WHO) 65 – 80% of the worlds health care practice includes the use of traditional medicine in some way.

There has also been a continuing demand for popular use of traditional medicine worldwide. In some low- and middle-income countries, traditional healers are either the only or the major health care providers for people living in rural areas.

Despite the progress in synthetic organic medicinal products, over 25% if prescribed medicines in industrialized countries are derived either directly or indirectly from plants (Newman et al, 2000).

However, plants used in traditional medicine are still being studied (Kirby 1996; Hostettmann and Marston, 2002).

According to the World Health Organization, 21,000 plant species have the ability to be used as medicinal plants. Despite the great consideration given to traditional medical practice around the world, there is the lack of reference standards for determining proper and uniform dosage of traditional medicine for patients. The direct effect is the creation of incomplete and not very correct information as regards traditional medicines.

The WHO has set out a strategy for traditional medicines with four objectives to integrate them as policy into national health care systems to provide knowledge and guidance on their efficacy, quality and safety in order to improve their therapeutic image (WHO traditional medicine strategy, 2014 – 2023).

There are still other reasons apart from the ones already mentioned why there is greater dependence on indigenous herbal medicines and they are; acceptability, lack of communication, problems of ignorance, poverty and unavailability of modern health facilities (Tiwari and Mehta, 2013).

JATROPHA TANJORENSIS

Jatropha tanjorensis is a "common weed" of field crops which belongs to the family Euphorbiaceae. It is a shrub of about 1.8m in height and is usually grown in rain fall forest zones. *Jatropha tanjorensis* is consumed as a leafy vegetable as well as a medicinal plant. The plant contains important biologically active components known as phytochemicals in large amounts.

It contains saponins, flavonoids, alkaloids and tannins which occur in moderate amounts. Other compounds; phenols, phlobatannins and glycosides occur in low amounts.

Jatropha tanjorensis is well known for its use as a laxative. Every part of the *Jatropha* plant including the leaves, seeds and bark used fresh or as decoctions are employed in traditional, folk medicine and also in the areas of veterinary medicine. Due to its anti-oxidant and hypoglycemic properties leaf extracts of the plant is used in the treatment of diabetes, hypertension and malaria. It has shown anti-microbial, hematological, anti-malarial, hypolipidemic and anti-hypertensive activities amongst others.

Jatropha tanjorensis is also reported to contain phytochemical constituents that are capable of lowering blood cholesterol levels and this is useful in the treatment of cardio vascular diseases caused by hyperlipidemia.

The common names of *Jatropha tanjorensis* include;

Hospital too far, Catholic vegetables, Jatropha, Lapa lapa, Botuje, American leaf (ewe Americana), Chaya, Miracle leaf, Tree spinach, Tanjore Jatropha , Physic nut, Ugu oyibo

Recent claims suggests that *Jatropha tanjorensis* is not safe for prolonged consumption and that it could be toxic to organs of the body. Although plant based natural medicines are widely acclaimed to be safe, scientists advocate for proper toxicological studies in order to ensure safety when using the plant as dietary or medicinal source.

A major drawback is that, like most members of the family of Euphorbiaceae, *Jatropha tanjorensis* contains several toxic substances which include lectins and saponins which can cause health problems when taken in large amounts and for extended periods of time.

STATEMENT OF PROBLEM

Traditional medicinal practices are fast becoming a major topic of global relevance and discussion. Despite the remarkable progress recorded by the use of synthetic organic medicinal products of the twentieth century, more than 25% of prescribed medicines in industrialized countries are synthesized directly or indirectly from plants (Newman et al, 2000).

Since countries in Africa mostly called developing nations are often faced with the challenge of not being able to afford new drugs, up to 80% of the population make use of medicinal plants as remedies (Kirby, 1996; Marston, 2002).

Traditional medicine is becoming increasingly popular in both developing and developed countries (Onwuliri and Wonang, 2005). It has been known as the first medical care administered to many Nigerians.

Medicinal plants and their uses by indigenous cultures is not limited to conservation of cultural traditions and biodiversity but also for community health care and drug development both now and in the future (Hanazaki et al, 2000; Pei, 2001)

There is a rapid growth of markets for medicinal herbs with economic gains that are highly significant from sales that are estimated at 60 million U.S dollars in the year 2000 (WHO, 2003).

AIM

The study aims at evaluating the histopathological effects of aqueous and methanol leaf extracts of *Jatropha tanjorensis* on the liver of albino rabbits

SIGNIFICANCE OF THE STUDY

Having a concise herbal knowledge of indigenous plants for the treatment of different conditions can play a vital role in initiating a document base line data for future pharmacological and phytochemical analysis. Medicinal plants have been a source of income to a large number of people. What this means is that exploring the medicinal value of these indigenous plants can improve market profile, socio-economic status and also influence trade among people that take advantage of its value.

The results obtained from this study, should among other benefits, improve existing literature on the effects of extracts relating to plants of interests on the normal functioning of the liver.

Results obtained should serve as a guide to individuals that consume plant products basically *Jatropha tanjorensis* as food sources or alternative treatment regimens. There are expected improvements on already existing information regarding the plant products.

CHAPTER TWO
REVIEW OF RELATED LITERATURE
HISTORICAL PERSPECTIVE OF TRADITIONAL MEDICINE

Treatments of diseases using pharmacological procedures began decades ago with the use of herbs (Schulz et al, 2001). All over the world methods of folk healing incorporated herbs as part of their tradition

The following traditions are mentioned here

CHINA

Chinese traditional medicine has a long history and has been used from ancient times with the major/ primary sources of remedies being from plants. There are over 12,000 items used by traditional healers with about 800 in common use (Li, 2000). The use of these botanical products is employed often times after some form of processing has been carried out. Some procedures used are soaking in water, alcohol or any other extract, stir frying, roasting, boiling, oven drying etc.

Traditional Chinese medicines are in common use where more than half the population regularly uses traditional remedies with the most prevalent use being in rural communities.

More than 5,000 traditional remedies are available in china and these accounts for approximately one fifth of the entire Chinese pharmaceutical market (Li, 2000)

Traditional Chinese medicine otherwise called TCM is a complete medical system that has been used to diagnose, treat and prevent illness. This system has been on a belief in yin and yang which are described as opposing forces or energies such as earth and heaven, winter and summer, night and day, happiness and sadness.

There are many benefits from using traditional Chinese medicines. Some of the benefits are

i. It activates the natural self-healing abilities of the body in order to boost energy and immunity, an overhaul/ rebalance of our inner body system to relieve pain, promote a youthful looking skin, improve the health of vital organs, reduce anxiety and stress, it also helps to stop the reappearance of various diseases while at the same time halting their progression.

Ginseng is recorded as the most commonly used Chinese medicine.

There is a major concept of TCM (traditional Chinese medicine) which is an important force of life known as Qi that surges through the body. When there is an imbalance in Qi, illnesses are bound to occur. The imbalance is thought to be caused by an alteration in opposite and complementary forces that constitute the Qi. These are the forces known as Yin and Yang.

Balance between health and diseases is a primary concept and Chinese traditional medicine (TCM) seeks to restore this said balance through treatments that are regarded as individual specific.

For balance to be restored, it should be present between the internal body organs and the elements of fire, water, earth, metal and wood which are termed external.

TRADITIONAL AFRICAN MEDICINE (TAM)

Africa is home to a vast number of medicinal plant life. Most of the medicinal plants include commonly used herbs such as Cape Aloe (*Aloe ferox*), Roubos (*Aspalathus linearis*) and Hoodia (*Hoodia gordinii*).

Traditional African medicine is regarded as a holistic health care system which is comprised of 3 (three) stages of specialization which include divination, spiritism and herbalism. The World Health Organization (WHO) posits that more than 80% of people in Africa depend on traditional medicine for their health care needs (WHO 2003).

Illness is considered in traditional African medicine as a disorder that has both natural and supernatural causes and should be treated using both physical and spiritual means using different procedures that incorporate herbs, animal sacrifice, exorcism, incantations and divinations.

About 4,000 plants have been documented for their different pharmacological activity with the primary reason for any traditional concept being an all-encompassing healing that maintains the stability of life between the body, mind and soul together with the external environment. Most practitioners of traditional African medicine have bogus claims to have the ability to cure a vast array of conditions which include psychiatric disorders, asthma, glaucoma, urinary tract infections, cancer, barrenness etc.

A basic draw back here is that there is little or no scientific validation since most of the knowledge is transferred orally.

INDIAN AYURVEDIC MEDICINE

In India, Ayurvedic medicine (Ayurveda) has been practiced for centuries and herbal remedies are the responsibility of a government department called AYUSH: Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homeopathy.

Ayurveda is a derivative of the Sanskrit word Ayur which means life and Veda which means science or knowledge. It is a medical system practiced in India based on the belief that health and wellness are both dependent on a balance between the spirit, body and mind with its basic goal being to promote good health rather than fight disease.

The basis of Ayurvedic medicine is the concept of universal interconnectedness between the body's constitution known as Prakriti and life force called doshas.

Ayurveda is known as one of the world's oldest medical systems native to India that uses a range of treatments which include massage, Acupuncture, Yoga and herbal medicine poised to encourage health and wellbeing.

There is an understanding among practitioners of Ayurvedic medicine that a unique combination of air, water, fire, earth and space make up each individual and these elements form the three energies called the doshas.

The doshas are;

a) Kapha dosha

b) Pitta dosha

c) Vata dosha

1. **KAPHA DOSHA**

This literally means that which binds or holds things together. It is responsible for substance, lubrication, stability and support of our physical body.

2. **PITTA DOSHA**

Pitta translates roughly as fire. It is the heat energy in the body that is invisible and manifests itself in our metabolism

It generally represents heat, energy or fire giving rise to many [powerful qualities in our body and mind.

3. **VATA DOSHA**

This is the Ayurvedic mind-body element associated with air and space. It governs all the processes in the mind and body. Exemplified by processes like blood flow, elimination, breathing and movement of thoughts in our mind.

According to Ayurvedic beliefs an individual becomes ill due to an imbalance in his/her dosha and practitioners treat a person by rebalancing these energies using herbal medicines, exercises, meditation, breathing, physical therapy and other methods.

The major goal of Ayurveda is to restore balance to the body, mind and spirit.

Yet another form of Ayurvedic treatment implies that there are channels or Srotas that transport fluids emphasizing that these channels can be opened up by massage treatment. Unhealthy or blocked channels are thought to cause disease.

The general outcome of Ayurvedic life style and medical treatment is a healthy body and mind with the first aim being to connect people to a deeper experience of who they are. Ayurveda is known as the true-body-mind-spirit medicine which allows people to understand, appreciate and integrate every aspect of who they actually are. There is a major difference between Ayurvedic and core herbal medicine and this is the practice by which plant-based ingredients are used in herbal treatment to treat particular symptoms

or conditions. Whereas, Ayurvedic remedies are more holistic and incorporate life style modifications. Though Ayurvedic remedies combine products basically derived from plants, they may also include animals, minerals, diets, exercise, and life style practices.

There are medical/ clinical trials coupled with systematic research reviews that suggest Ayurvedic approaches are effective.

There are countries where the legal standing of Ayurvedic practice is equivalent to that of conventional medical practice.

SOME USES OF MEDICINAL PLANTS

MEDICINAL PLANTS AS STIMULANTS

The aphrodisiac food or drug that arouses sexual instinct, property of a Nigerian medicinal plant; Securidaca longepedunculata in albino rats was investigated by Hamza K. Yusuf with 20 albino rats in two groups of 10 (5 males, 5 females) in addition to a control group. Uniform conditions of age, weight, temperature, photoperiod, humidity, water, rat feed was maintained before extracts were administered in doses of 10mg/kg, 100mg/kg and 1000mg/kg according to the procedure of Lorke.

The penile erection index for each group was determined within a 3-hour period of administration. From results obtained, Aphrodisiac property was implicated in the sample by very high PEI from the lowest value of 24 to the highest value of 500 with a standard value of 22.

MEDICINAL PLANTS AS SOURCES OF INCOME

A study in 2010 by Idu et al, on the documentation of medicinal plants sold in markets in Abeokuta, Ogun State, Nigeria reported that a total of 60 medicinal plant species were commonly sold and used by the people in the area in the treatment of various ailments such as hypertension, malaria, typhoid fever, Jaundice, Anemia, Skin irritation, hyperthermia, Gonorrhea, Fibroid, Cough, etc. In conclusion, they advocated the need for domestication and cultivation of medicinal plants while also advocating for conservation measures to be put in place to ensure sustainable sources of medicinal plants to strengthen the national health care system.

CHAPTER THREE
METHODOLOGY

MATERIALS: PLANT MATERIALS

Plant Materials Identification and Collection

Fresh leaves of *Jatropha tanjorensis* was collected from a farm in Sagbama Town, Bayelsa State, Nigeria, Identification of plant material was done by a Taxonomist, Dr. Obed Oruwari.

AQUEOUS EXTRACTION OF PLANT MATERIAL

Procedure:

Fresh leaves of *Jatropha tanjorensis* was collected from the farm, the leaves were washed with clean tap water and excess water was removed from the leaves using a centrifuge.

The leaves were air dried under a shade, distributed and kept in plastic bags for 48 hours.

The leaves were blended using a blender, stirred and sterile water was added. The mixture was turned into tubes and again centrifuged to separate plant residues. Filtering of the solution was the next step to be carried out with aqueous extracts being stored in sterile tubes in the dark at 4^{o}C to retain the strength of active plant components.

METHANOLIC LEAF EXTRACT OF JATROPHA TANJORENSIS

Procedure:

Freshly plucked leaves of *Jatropha tanjorensis* was collected, washed, air dried under a shade. The air-dried leaves were coarsely blended using a laboratory mortar and pestle. The product was macerated in absolute alcohol (96% methanol) to obtain the water and alcoholic (hydro alcoholic) crude extract using a suction flask for 3 days at room temperature.

The filtrate was separated after 72 hours using chromatography papers.

Materials: Animals

30 albino rabbits with weights 2.80 – 3.00kg were bought from Dr. Japhet Ebi's animal house in Yenagoa, Bayelsa State, Nigeria.

The rabbits were exposed to uniform conditions of age, weight, environment, rabbit feed (growers mash) and acclimatized to the new environment for a period of two (2) weeks before the commencement of the experiment.

STUDY AREA

The study area was Sagbama Local Government Area of Bayelsa State which is one of the largest Local Government Areas in Bayelsa State. It was created in 1976 and has its headquarters in Sagbama Town with an estimated population of 24,603 inhabitants.

It is made up of 38 communities and 14 wards. The most common language spoken is the Ijaw language with Christian religion and traditionalism being the most common religions practiced. Fishing is the major occupation, with farming also being carried out. The mineral resources commonly found in Sagbama are crude oil and natural gas.

RESEARCH DESIGN

The research design was a laboratory experimental design.

GROUPING OF EXPERIMENTAL ANIMALS

Thirty (30) albino rabbits weighing 2.80 – 3.00kg were housed in six (6) cages in the following order.

Cages 1 and 2: Control group rabbits

Cages 3 and 4: Experimental Group 1; Aqueous leaf extracts of *Jatropha tanjorensis*

Cages 5 and 6: Experimental group 2; methanol leaf extracts of *Jatropha tanjorensis*

CAGE DIMENSIONS

30 inches deep by 36 inches long by 24 inches high. The dimensions do not include the space occupied by animal feed and water dishes.

CONTROL GROUP FEEDING

The control group consisted of 10 albino rabbits weighing 2.80 – 3.00kg. The group was administered 3kg of grower's mash feed ad libitum: as desired.

WATER FOR CONTROL GROUP

300ml volume of distilled water was stored in water troughs and served as drinking water for the control group animals.

EXPERIMENTAL GROUP 1 (AQUEOUS LEAF EXTRACTS OF JATROPHA TANJORENSIS (FEEDING)

Experimental group 1 (Aqueous leaf extract) consisted of 10 (ten) albino rabbits weighing 2.80 – 3.00kg. This group was administered 3kg growers mash feed per 300ml aqueous leaf extracts of *Jatropha tanjorensis.*

EXPERIMENTAL GROUP 2 (METHANOLIC LEAF EXTRACTS OF JATROPHA TANJORENSIS)

Experimental group 2 (methanolic leaf extracts of *Jatropha tanjorensis*) consisted of 10 (ten) albino rabbits weighing 2.80 – 3.00kg. This group was administered 3kg growers mash feed per 300ml methanolic leaf extracts of *Jatropha tanjorensis.*

OTHER MATERIALS

i. Feeding bowls for grower's mash feed
ii. Plastic water containers for water and extracts of *Jatropha tanjorensis*
iii. Plastic sieves
iv. Plastic trays
v. Animal cages

MATERIALS FOR HISTOLOGY STUDY

a. Alcohol
b. Formaldehyde
c. Xylene
d. Paraffin wax
e. Tissue blocks for embedding of tissues
f. Microtome
g. Hematoxylin and eosin (H and E) stain

DATA COLLECTION

The thirty albino rabbits were "housed" in 6 cages with each cage carrying 5 rabbits in the following order. Cages 1 and 2 was made up of control group animals.

Cages 2 and 4 "housed" rabbits administered aqueous leaf extracts of *Jatropha tanjorensis.*

Cages 5 and 6 "housed" rabbits administered methanolic leaf extracts of *Jatropha tanjorensis.* Feeding and administration of water was done ad libitum: as desired on a daily basis. The cages were cleaned daily to bring to the barest minimum negative effects arising from poor sanitary conditions.

On day 90 (termination date), the rabbits were "sacrificed" (euthanized) with liver tissues of all three groups viz: control, experimental group 1 and 2 being excised for histology study.

HISTOLOGY STUDY

The liver tissue obtained from animals were prepared for histology study. The tissues were cut into sections and dehydrated with a range of concentrations of ethyl alcohol, cleared with xylene and embedded in molten paraffin wax. The embedded tissue blocks were sectioned with a rotary microtome and slides prepared with the sections.

Staining of the tissue was done using Ehrlich's hematoxylin and eosin (H and E) blue using Lillie's method.

CHAPTER FOUR

RESULTS

The effects of aqueous and methanol leaf extracts of *Jatropha tanjorensis* on the liver of albino rabbits was investigated. Weights of control and experimental group 1 and 2 rabbits increased significantly ($P \geq 0.01$) from 300 + 2.0kg day 1 to 375kg + 4.0kg on day 90 when the experiment was terminated.

Appetites of both control and experimental group rabbits increased from the start of the experiment to the day the experiment was terminated. Appetite increased from +1 on day 1 to +10 on day 90 when the experiment was terminated.

The histopathological effects of aqueous and methanol leaf extracts of *Jatropha tanjorensis* on the liver of albino rabbits are shown in figures 1 (a, b, c). Control group liver architecture was normal and devoid of histological changes. Liver cells of aqueous leaf extracts were mildly distorted with features of fatty degeneration at early stages. There were hepatocytes with Micro vesicular steatosis (MIST). For liver cells of methanol extracts, distortions were observed with localized infiltration of Inflammatory cells (INF).

From these histopathological effects, it is obvious that both aqueous and methanol leaf extracts of *Jatropha tanjorensis* had significant impact on the liver of albino rabbits.

The extract at very high doses, showed the potential to cause liver cirrhosis and hepato toxicity of liver cells.

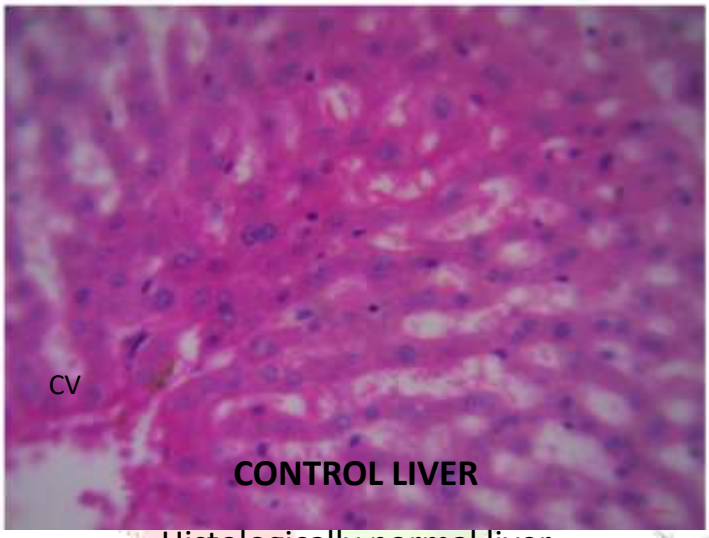
CONCLUSION

From studies conducted, the median lethal doses of most of the plant products (extracts) are suggestive of relative safety of the plant. A note of caution however is that prolonged use of large quantities of the plant extracts may need to be avoided in order to halt potential damage to vital organs such as the liver.

From this present study, extra fat in the liver caused inflammation which may eventually lead to scarring (fibrosis) or more serious diseases like liver cancer. Micro vesicular steatosis is a serious and possibly fatal condition of the liver.

In summary, prolonged consumption of *Jatropha tanjorensis* either in an aqueous medium or methanol extraction can deleteriously affect vital organ such as the liver. Aqueous extracts caused milder effects when compared with methanol leaf extracts, which means that higher toxicity levels were present with methanol leaf extracts.

PHOTOMICROGRAPHS OF THE LIVER



CONTROL LIVER

Histologically normal liver
Central vein (CV)
Hepatocytes (HEP)
Sinusoids
containing Kupfer
cells.

Figure 1b

Aqueous extracts of *Jatropha tanjorensis*
mildly distorted liver.
Fatty degeneration at early stages

PHOTOMICROGRAPH OF LIVER

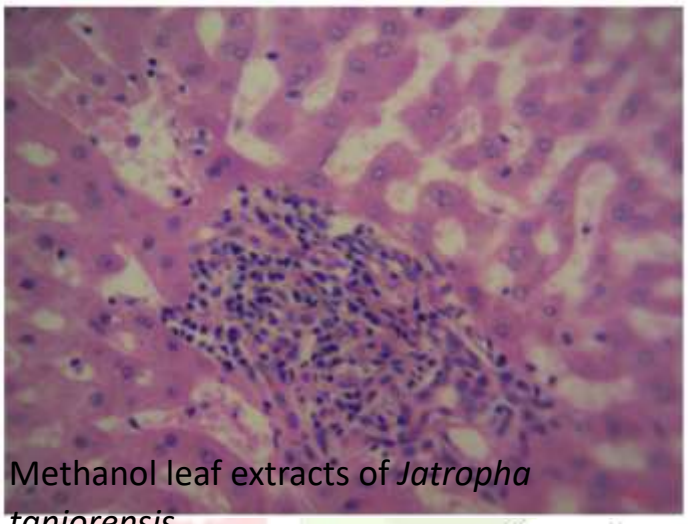


Figure 1c

Methanol leaf extracts of *Jatropha tanjorensis*

Distorted liver

Localized infiltration of inflammatory cells (INF) encircled

Intact hepatocytes (HEP)

Sinusoids (Sin) containing Kuppfer cells and capillaries

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