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THE ANTI DIARRHEAL EFFECT OF THE STEM BARK AUEOUS EXTRACT OF JETROPHA CURCAS

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ABSTRACT

Jatropha curcas is a medicinal plant commonly grown in the tropics has been reported to possess a number of medicinal features. The research conducted is to scientifically determine the anti diarrheal effect of the stem bark of the plant on wister albino rats. Like atropine 3mg/kg body weight at doses of 25, 50, 100 and 150mg/kg body weight produce a significant decrease in severity of the diarrhea. The volume and weight of the intestinal content was significantly decrease when atropine and the extract were administered. (P< 0.05).

Keywords: Jatropha Curcas, Anti Diarrheal, Stem Bark, Atropine, Albino Rats

INTRODUCTION

Diarrhea is a symptom marked by rapid and frequent passage of semi solid or liquid feacal material through the gastrointestinal tract and involves both an increase in the motality of the gastrointestinal tracts alone with increased secretion and a decrease in the absorption of fluid and thus a loss of electrolytes particularly Na^+ and water [1]. Diarrhea has long been recognized as one of the most important health problem and leading cause of motality and mobidity in developing countries and produces more illness and cause death of more infants and children below five years old than all other diseases combined. In fact to say that it is one of the leading causes of growth retardation and death in infants is not exaggeration [2]. Herbal medicine is use of plants for medicinal purpose since time immemorial. Plants have been the basis for Medicare treatment. Modern medicine began a move away from herbal treatment in the 19^{th} century in favour of treatment based on evidence gathered using scientific method. Plants derived chemical compounds remained important plant of medicinal treatment.

Jatropha curcas is one of the plants that are of medicinal importance. Scientific Name:- Jatropha curcas L,Family Name:- Euphorbiacese.Common names:- physic

nut, purging nut, Barbados nut, Black vomit nut, Curcas Bean and Purging nut tree. Local names include: **Yoruba** Botuje, lapalapa funfun, **Hausa**: Binedazuga **Igbo**: olulu idu, owuli idu[3]. Jatropha are of different species namely, Jatropha curcas, Jatropha hasfafa, Jatropha gossypyfolia, Jatropha multifida, Jatropha podagoica and Jatropha heynei. Among the thousands of the well known medicinal plants in the world, Jatropha curcas is one of the medicinal plant that had been discovered, possessing the features that makes it useful in curing different types of diseases among which diarrhea is not an exception. Because of its medicinal usefulness, it is known cultivated in tropical countries throughout the world. Widely planted as a medicinal plant which soon tends to establish itself. In some parts of the world, e.g. Brazil, Fiji, India, Salvado, it is listed as a weed.

The roots, stems, leaves, seed, and fruit of the plant have been widely used in traditional folk as medicine in many parts of West Africa. Jatropha curcas is a small tree or shrub with smooth gray bark, exudes a whitish colored, watery latex when cut. Normally it grows between three and five meters in height, but can attain a height of up to eight or ten meters under favorable conditions.[**4**] Regarding climate, Jatropha curcas is found in the tropics and like heat, although it does very well even in lower temperatures and can withstand a light frost. Its water requirement is extremely low and it can stand long period of drought by shedding most of its leaves to reduce transpiration loss. A shrub or tree leaves usually light green and partially lobed with cordate base.

The fruits are green when young and turn brown /black when dry. Fruits have three black seeds when conspicuous caruncle. Propagated by cutting and seed [5]. The latex of Jatropha contains an alkanoid known as "Jatrophine" which is believed to have anti-cancerous properties. It is also used as an external application for skin diseases and rheumatism and for sores on domestic livestock. The tender twigs of the plant are used for cleaning teeth while the Juice of the leaf is used as an external application for piles. The seeds are considered antihelimintic in Brazil. Also, the ether extract shows antibiotic activity against styphylococcus aureus and Escherichia coli.[4] Leaves added to hasten, fermentation of cassava. Decoction of leaves used to sterilize umbilicus of new born babies [5]. It has been reported that Jatropha curcas roots have an anti- inflammatory activity in mice and rats. Anti-inflammatory activity of application of Jatropha curcas in root powder in paste form in TPA- induces ear inflammation was confirmed in albino mice and the successive solvent extraction of these roots was carried out by ether and methanol. The methanol extract

exhibited systemic and significant anti- inflammatory activity in acute carrageenan-induced rat paw edema. It also showed activity against formalin-induced rat paw edema, as well as, turpentine-exudative changes and cotton pellet-induced granular tissue formation after oral treatment for 7 days in albino rats. Thus, anti inflamatory activity might be due to effects on several mediator and arachidomic acid metabolism involving cyclo-oxygenase pathways resulting prostaglandin formation, anti-proliferative activity leading to reduction in granular tissue formation and leukocyte migration from the vessels [6].

It has been reported that Jatropha curcas extract causes anemia in rats. An investigation into the possible effects of the methanol extracts of jatropha curcas on some haematological parameters was carried on male albino rat. The extract was carried on male a progressive reduction in the Measured haematological values (packed cell volume, Haemoglobin concentration and red cell count). The reduction in value of red blood cells count and haemoglobin concentration were significantly pronounced in 8th day and 10th day treated rats compared with control. The LD_{50} in the acute toxicity test in mice was 25.19 mg. The results suggest that jatropha curcas most likely caused macrocytic hypochromic type of anaemia in rats [7].

MATERIALS AND METHODS

Reagents and Equipments

The chemicals and reagents used for the research were of the AR grade and redistilled water (RD H2O) was used in preparation and dilution of all the solutions. All the chemicals were procured from E. Merk, Germany

Experimental Animal

Albino ewiss rats, rattus, rattus Norwegicus, of either sex weighing between 70-172g were used in this research. A total of 90 rats were used. Brought at 2 weeks old and were fed with growers mash obtained at bama road Sanda's feed) for six weeks. The research was divided into three categories. The first has to do with castor oil-induced diarrhea in rats,(divided into 6 groups of five animals each) the second has to do with castor oil-induced enteropooling in rats (Animal were fasted overnight according to the method of Robert *et al* [8]) and lastly, castor oil induced small intestinal transit in rats. (animals were fasted for 14 hours, divided into 7 groups of five animals each).The number of both wet and dry diarrhea droppings were counted hour for a period of 4 hours mean of the stools by treated animal groups. It was then compared with that of positive control group given 2ml/kg, i.p of saline [9], to determine the Anti-diarrhoea

effect of the stem bark extract of Jatropha Curcas. The **castor** oil induced enteropooling and small intestinal transit were equally determined

RESULT AND DISCUSSION

Table 1: Effect of Stem Bark Aqueous extract of Jatropha Corcas on Castor Oil induced Diarrhea.

Treatment	Mean defaecation in four hour	% inhibition defaecation
Castor oil (1m1 p.o) +salime(2ml/kg, i.p)	12.25 ± 6.94[a]	-------
CO +atropine (3mg/kg, i.p)	6.0 ± 3.65[b]	51
CO +extract (25mg/kg i.p)	5.50 ± 3.51[a]	55
CO + extract (50mg/kg, i.p)	5.0 ± 3.16[a]	59
CO + extract (100mg/kg i.p)	64.75 ± 2.99[a]	61
CO + extract (150mg/kg,i.p)	2.75 ± 0.96[c]	76

Values on the same column with different superscript letters are significantly different ($p<0.05$) N=5. Values are expressed as mean ± s .d (standard deviation) ($p<0.05$) when compared with castor oil + saline treated group. The diarrhea was clinically obvious in most of the animal within 25min of administration, infected control group in the next 4hrs. The intraperitional injection of atropine 3mg/kg, i.p (51%) reduced the level of defaecation at ($p<0.05$). similarly a marked reduction in the level of defaecation was experienced when doses of 25,50,100mg/kg i.p (55.59 and 61%) was administered. However, a statistically significant decrease ($p<0.05$) was obtained when a dose of 150mg/kg i.p (76%) was administered. This implies that the higher the dose, the lower the rate dropping or stooling.

Table 2: The effect of Stem Bark aqueous of Jatropha Curcas on Castor Oil- Induced Enteropooling.

Treatment	Wt of intestinal content	% inhibition intestinal content
Castor oil(2ml p.0)+saline (2ml/kg,i.p)	4.0 ± 0.66[a]	-----
CO+ atropine (3mg/kg i.p)	1.70 ± 0.52[b]	58
CO+ extract (25mg/kg, i.p)	2.02 ± 0.45[a]	50
CO+ extract (50mg/kg, i.p)	2.24 ± 0.70[a]	44
CO+ extract (100mg/kg i.p)	2.34 ± 0.40[a]	42
CO+ extract (150mg/kg,i.p)	1.82 ± 0.51[c]	55

Values on the same column with different superscript letter are significantly different ($p<0.05$) (N=4,5). Values are expressed as mean ± SD (standard deviation) $p<0.05$ when compared with castor oil + saline treated group. From the above result, it is observed that atropine (3mg/kg, i.p) reduced the weight of intestinal content (58%) which is statistically significant at $p<0.05$. 150mg/kg, i.p dose of extract produced a statistically significant reduction ($p<0.05$) in the weight of intestinal content. 25,50 and 100 mg/kg i.p dose of the extract produced a mild reduction in the weight of intestinal content

Table 3: The effect of Stem Bark of Jatropha Curcas on Castor Oil induced Small Intestinal Transit in Rats.

Treatment	Total length of intestine	Distance traveled by marker	% intestinal transit
Saline(2ml p.o)(normal control)	87.54±11.43	54.34±14.76	$16.40±25.50^{e}$
Castor oli (2ml,p.o)+saline (2ml/kg i.p) (infected control)	80.20±7.43	43.80±21.40	$55.40±28.82^{a}$
CO+extract (25mg/kg, i.p)	91.30±1.58	31.0±1.58	$34.20±4.76^{a}$
CO+extract (50mg/kg,i.p)	88.44±11.34	24.30±6.78	$27.60±8.58^{d}$
CO + extract (100mg/kg i.p)	96.04±11.34	13.50±8.14	$13.88±6.58^{e}$
CO+ extract (150mg/kg i.p)	90.86±5.52	12.86±4.44	$14.34±4.89^{e}$
CO+ atropine (3mg/kg, i.p)	78.80±3.83	38.70±2.57	$48.80±2.99^{b}$

Values in the same column with different superscript letter are significantly different ($p<0.05$). Values are expressed as mean ± SD(standard deviation). $P<0.05$ when compared with infected control (CO+ saline) (n=4,5). The intestinal transit increased with castor oil (55.40±28.82%). But it was much more reduced with atropine (48.80±2.99%). There was also a marked reduction in all the concentration of the extract. 25.50 and 150 mg/kg, i.p of the dose extract 34.20±,4.76%. 27.60±8.56 and 14.34±4.89% intestinal transit induced by castor oil respectively. This was statistically at $p<0.05$. However, 100mg/kg, i.p dose produced 13.58± 6.58% of castor oil induced intestinal transit at $p<O.O5$. This implies that a percentage intestinal transit of castor oil- induced charcoal meal transit decreases as the concentration of the dose extract increases.

Diarrhea may be caused by an increase in osmotic load within the intestine, excessive secretion of electrolytes and water into the intestinal lumen, exudation of proteins and fluids from the mucosa, infection and inflammation and altered intestinal motility resulting in rapid transit [10]. But the research conducted earlier is based on the anti-diarrheal effect of the stem bark extract of Jatropha curcas. The diarrhea was induced by castor oil. Castor oil is reported to induced diarrhea by increasing the volume of intestinal content by prevention of the re-absorption of water. This property of castor oil is due to its active metabolite ricinolic acid [11]. The liberation of ricinolic acid results in irritation of the intestinal mucosa, leading to increase of prostaglandins, which result in stimulation of secretion, there by prevents the re-absorption of NaCl and water [11].

The result of the present research shows that the aqueous extract of stem bark of Jatropha curcas produced a statistically significant decrease ($p<0.05$) in the severity and frequency of diarrhea produced by castor oil. The reduction in the rate of stooling as seen in Table 1 May be as a result of increased re-absorption of water by decreasing intestinal motility. The delay in faecal emptying by the extract allows more time for fluid loses in the stool (Table 1.) which agrees with the research carried out by Penlap *et al* [11]. Weight and volumes of intestinal content decreases when electrolyte concentrations are slightly increasing. Logically, osmotic pull by the electrolyte should cause intraluminal fluid retention which also agrees with the research carried out by Penlap *et al* [11] on the "Evaluation of the antidiarrhcal activity of the fruit-Rind of picralima nitida (APOCYNACEAE)" on castor oil-induced diarrhea in wistar albinos rats of both sexes (Table 2). Extract increase the re-absorption of water by decreasing intestinal motility as observed in the decrease of intestinal transit by charcoal meal (Table 3) statistically significant at ($P<0.05$).

The administration of the aqueous extract of jatropha curcas stem bark was associated with significant cure against diarrhea. The stem bark of Jatropha curcas may possess some compound with anti-secretory properties which may account for its efficacy against diarrhea induced by castor oil. In this research, atropine was effective in castor oil-induced enteropooling and gain in weight of the intestinal content suggest that there might be some mediators other than acetylcholine that are involved in castor oil-induced enteropooling [12]. Probably, extracts increased the re-absorption of NaCl and water by decreasing intestinal motility as observed by decrease in intestinal transit by charcoal meal which agrees with the research carried out by Havaging *et al* [13]. The antidiarreal

actions of the extracts may be also as a result of the presence of denatured proteins forming protein tannets. Protein tannates make the intestinal mucosa more resistant and reduce secretion [12].

CONCLUSION

The extract of the stem bark of Jatropha curcas resulted in the marked reduction in the number of diarrhea stools, and the reduction in the weight of intestinal contents as well as a marked reduction in intestinal transit, this signifies its clinical usefulness.

RECOMMENDATION

We recommend that further research should be carried out to understand the full mechanism of action of the anti-diarrhea effect of the stem bark extract of jatropha curcas.

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