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The Effect of Aqueous and Alcoholic Extracts of Roselle, Tamarind and their Mixture on Liver Function and Lipid Profile in Rats Treated by Potassium Bromate

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Abstract

A study was conducted to investigate the effect of aqueous and alcoholic extracts of Roselle, Tamarind and their mixture on liver function and lipid profile in rats treated by potassium bromate. A total number of 40 mal albino rats were devided into 8 groups each of 5 rats, one of them served as control negative group, then remain groups of rats treated with potassium bromate (20mg/kg bw) orally intragastric twice a week for 4 weeks, one of them served as control positive group. Treatments groups received 40mg/kg bw daily of aqueous or alcoholic extracts of roselle, tamarind and their mixture during experimental period. Blood was collected and serum was used for measure serum alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), total Protein, Albumin, Globulin, Triglycerides (TG), Total Cholesterol , HDL-c, LDL-c, and VLDL-c, also atherogenic index (AI) was calculated. The results showed that alcholic extract of tamarind and mixture showed perfect effect in the levels of ALP and ALT, whereas the good treatment in the level of AST found for aqueous and alcoholic extracts of mixture and alcholic tamarind extract which did not significantly different than normal rats. Extracts of roselle showed in levels of liver Enzymes non significant changes compared to control Positive group. Aqueous and alcoholic extracts of roselle, tamarind and their mixture led to significant increase

in HDL-cholesterol levels and decrease in levels of total cholesterol, LDL-c and VLDL-c. All extracts of treatments did not reveal any significant changes in Triglycerides, total cholesterol, VLDL-c and atherogenic index compared with normal rats. The highest increase in the plasma HDL-cholesterol levels recorded for roselle alcholic extract and aqueous of mixture extract. The perfect effect on lipid profile in general was recorded for aqueous and alcoholic extracts of mixture. It is worthing observed that there was no significant difference between aqueous and alcoholic extracts in each type of tested plants and their mixture, which refer to the good effect of aqueous extracts. In conclousion mixture of roselle and tamarind serve as a good cholice for health effects on liver function and lipid profile. More studies were needed to detect the perfect and safe dose of these plants to use in human.

Key words: Hibiscus sabdariffa – LDL-c – VLDL-c – HDL-c – cholesterol – AST – ALT – ALP.

Introduction

Hibiscus plant (Malvaceae) includes more than 300 species, Among them is Hibiscus sabdariffa, L.which is a valuable source of traditional medicine **(Ubani *et al*., 2010)**. The dried flower contain the flavonoids, gossypetin, sabdaretin, hibiscetin **(Pietta, 2000),** also, the presence of saponin, tannins, cyanogenic glycoside had been reported **(Lin *et al*., 2003)**. Anthocyanins, flavonols and protocatechoic acid along with other phytochemicals have been identified as contributors to the observed medicinal effect of *Hibicus sabdariffa* **(Seca *et al*., 2001)**. Scientific research has established that the extracts of this flower have antihypertensive properties **(Odigie *et al*.,2003; El-Mahmoudy *et al*.,2014; and Joven *et al*., 2014)** antidiabetes **(Rosemary,2014)**, antioxidant properties **(Sini *et al*.,2011; and Obouayeba *et al*.,2014)**, anti-obesity **(Alarcon Aguilar *et al*., 2007; and Kim *et al*.,2007)** and protects against sperm damage. In addition to being a herbal medicinal agent, is use as a local drink material in many countries, including Iraq , where it is commonly called Cajarat **(Idris *et al*., 2012)**. This plant is used by people in Africa and particularly in Côte d'Ivoire via direct or indirect pathways in the treatment of several diseases. The approach of *H. sabdariffa* is equally significant in alternative system of medicine as

well as in conventional system of medicine. H. sabdariffa is an aromatic, astringent, cooling herb that is currently used Tropical areas. It is known to have diuretic effects, to help lower fevers and is an antiscorbutic. The leaves are antiscorbutic, emollient, diuretic, refrigerant, and sedative. The plant is also reported to be antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, purgative and resolvent. It is used as a folk remedy in the treatment of abscesses, bilious conditions, cancer, cough, debility, dyspepsia, fever, hangover, heart ailments, hypertension, and neurosis **(Vilasinee *et al.*, 2005)**. Tamarind is also extensively used in Nigerian traditional medicine especially in the north-western region. *Tamarindus indica, Linn*. (commonly called Tamarind), family Fabaceae, subfamily Caesalpiniaceae is a tropical evergreen tree native to fertile areas throughout Africa and Southern Asia. It is widely cultivated as an ornamental tree and for its acidic fruits used in making drinks and a popular component of many decoctions used as health remedies. *T. indica* is used as a traditional medicine in India, Sudan, Nigeria, Bangladash and most of the tropical countries. T. indica is rich in nutrients and plays an important role in human nutrition, mainly in the developing countries **(Mohamed and Rangappa, 1992; Yanez *et al.*, 1995)**. It contains high level of crude protein with many essential amino acids, which help to build strong and efficient muscles. It is also high in carbohydrates which provides energy and also rich in minerals such as potassium, phosphorus, calcium and magnesium. It can also provide asmaller amount of iron and vitamin A. Phytochemical investigations carried and revealed the presence of many active constituents, such as phenolic compounds, cardiac glycosides **(Rasu *et al.*, 1989)**, malic acid **(Kobayashi *et al.*, 1996)**, tartaric acid, mucilage, pectin, arabinose, xylose, galactose glucose and uronic acid **(Ibrahim and Abbas 1995; and Coutino-Rodriguez *et al.*, 2001)**. In Northern Nigeria, the fresh stem bark and leaves are used as decoction mixed with potash for the treatment of stomach disorder, general body pain, jaundice, yellow fever and as blood tonic and skin cleanser. Tamarind preparations are used as aid in the restoration of sensation in cases of paralysis, reduction of body temperature in fevers, and as laxatives, expectorant **(Komutarin *et al.*, 2004)**. The plant parts have been extensively studied in terms of pharmacological activity of its major compounds and results indicated potent antibacterial, antifungal, hypoglycaemic, cholesterolemic

(Khanzada *et al*., 2008), hypolipomic, antioxidant **(Tsuda *et al*., 1994; and Martinello *et al*., 2006)**, antihepatotoxic **(Joyeux *et al*., 1995)**, anti-inflammatory **(Rimbau *et al*., 1999)**, antimutagenic (**Ramos *et al*., 2003**) and antidiabetic **(Maiti *et al*., 2004)** properties. **Shehla *et al*. (2007)** isolated two triterpenes, lupanone and lupeol, from methanolic extract of the leaves of *T. indica*. Ingestion of T. indica fruit has been reported to have an additional beneficial effect on the mobilization of deposited fluoride from bone, by enhancing urinary excretion of fluoride **(Khandare *et al*., 2004)**. The phytochemicals work in the human system and due to their therapeutic properties cure many ailments which cannot be cured by the modern drugs **(Rahman *et al*., 2001)**. In recent years attempts have been made to investigate the new drug against infectious diseases. This may help to develop safer antimicrobial drugs **(Khanzada *et al*., 2008)**. Because of its wide usage and availability, this study was aimed to investigate the antimicrobial activity of stem back of the plant against some clinical isolates. It is therefore important to establish the safety of food, drink and drugs before they are ingested. The current study was, therefore, aimed to determine the effects of aqueous and alcoholic extracts of roselle, tamarind and their mixture on liver function and lipid profile in rats treated by potassium bromate.

Materials And Methods

Plant Materials

The plants material used in this study were *Hibiscus sabdariffa, L*. Calyx and Tamarind .The plants material were purchased from local market in Menouf, Menufia governorate, Egypt.

Preparation of Extracts

The calyx of *Hibiscus sabdariffa* were collected and shade dried for seven days. The dried calyces were milled using grinder to get powder which used for the extraction. The pulp of *Tamarindus indica* were obtained using after removing seeds. Aqueous and alcoholic extracts from of Roselle (*Hibiscus sabdariffa*) and Tamarind (Tamarindus indica) prepared by soaking 250g of the *Hibiscus sabdariffa* calyx or *Tamarindus indica* in 1L of distilled water or 70% ethanol alcohol and kept overnight (12 hours), and the mixture was filtered. The filtrate was evaporated to dryness using rotary Vacuum evaporator. The extract was weighed and stored until required.

Animals

Fourty adult male albino rats weighing 150g were purchased from Helwan Experimental Animals Station . Rats were housed in wire cages under the normal laboratory condition and fed on Grand Cereals and water. The rats were made to acclimatize to the ambient environments for seven days before commencing the research.

Study Design

A total number of 40 mal albino rats weighted between 140 and 160g were used. All rats were fed on basal diet for 7 consecutive days to make adjustment, then rats were devided into 8 groups each of 5 rats as following:

Group (A): control negative group, rats fed on basal diet for four weeks.

Group(2): control positive group, in which treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks.

Group(3): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and Extract of aqueous *Hibiscus sabdariffa* 40 mg/kg body weight.

Group(4): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and Extract of alcoholic *Hibiscus sabdariffa* 40 mg/kg body weight.

Group(5): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and Extract of aqueous Tamarind 40 mg/kg body weight.

Group(6): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and Extract of alcoholic Tamarind 40 mg/kg body weight.

Group(7): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and mixture aqueous extract of them 40 mg/kg body weight.

Group(8): rats treated with potassium bromate 20 mg/kg body weight orally intragastric twice a week for four weeks and mixture alcoholic extract of them 40 mg/kg body weight.

Blood collection

Blood samples were collected from all the treated and control rats after 12 hours fasting at the end of experiment in which the rats were scarified under ether anaesthetesia. Plane sterile test tubes were used to collect blood samples for serum electrolytes, preceded by centrifuging and subsequent separation of the blood plasma with a standard pipette.

Blood analysis

Alkaline phosphatase (ALP) activity was assayed in the liver according to the method of **Wright *et al*., (1972)** while the activities of aspartate transaminase (AST) and alanine transaminase (ALT) were determined in the liver following the method of **Reitman and Frankel (1957)**.The concentrations of creatinine, urea, uric acid, bilirubin, total protein, albumin and electrolytes, were determined in the serum following standard procedures as described in the respective assay kits. TC and HDLc were estimated using the procedures outlined incommercial kits(RandoxLaboratoriesLtd). Low density lipoprotein cholesterol (LDLc) and very-low-density lipoprotein cholesterol (VLDLc) were calculated using the formulae of **Friedewald *et al*., 1972.**

Statistical analysis

The data were statistically analyzed using a computarized Costat program by one way ANOVA. The results are presented as mean ± SD. Differences between treatments at $p \leq 0.05$ were considered significant.

Results

Data presented in table (1) showed the effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on liver enzymes in rats treated by potassium bromate.

The potassium bromate treatment resulted in significant rise in the levels of AST, ALT and ALP when compared to normal group ($p \leq 0.05$). Aqueous and alcoholic extracts of roselle showed nonsignificant decreases in the levels of ALP, ALT and AST, while levels of ALP,

ALT and AST were significantly decreased when rats treated with Aqueous and alcoholic extracts of tamarind and mixture compared with the possitive group ($p \leq 0.05$). The perfect effect in the levels of ALP and ALT recorded for alcholic extract of tamarind and mixture, whereas the good treatment in the level of AST found for aqueous and alcoholic extracts of mixture and alcholic tamarind extract which did not significantly different than normal rats ($p \leq 0.05$).

Table (1) : Effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on liver enzymes in rats treated by potassium bromate.

Parameters / Groups	ALP (u/l) Mean ± SD	AST (u/l) Mean ± SD	ALT (u/l) Mean ± SD
Control (-)	$178.64^{c} \pm 1.66$	$147.16^{c} \pm 3.29$	$74.05^{d} \pm 5.47$
Control (+)	$294.34^{a} \pm 2.03$	$228.84^{a} \pm 7.45$	$173.99^{a} \pm 1.36$
40 mg/kg aqueous roselle extract	$289.21^{a} \pm 5.23$	$219.8^{a} \pm 2.04$	$166.5^{a} \pm 6.18$
40 mg/kg alcholic roselle extract	$259.88^{a} \pm 2.49$	$201.21^{ab} \pm 1.97$	$156.55^{ab} \pm 4.56$
40 mg/kg aqueous tamarind extract	$221.29^{b} \pm 2.096$	$185.36^{b} \pm 1.09$	$141.61^{b} \pm 2.3$
40 mg/kg alcholic tamarind extract	$163.76^{c} \pm 1.98$	$147.55^{c} \pm 4.46$	$85.48^{cd} \pm 7.63$
40 mg/kg aqueous mixture extract	$220.49^{b} \pm 2.27$	$149.37^{c} \pm 2.29$	$101.86^{c} \pm 9.44$
40 mg/kg alcholic mixture extract	$162.6^{c} \pm 4.83$	$146.33^{c} \pm 2.88$	$80.73^{d} \pm 3.89$
LSD: $p \leq 0.05$	36.328	28.294	17.628

Mean under the same column bearing different superscript letters are different significicantly ($p \leq 0.05$).

Data presented in table (2) showed the effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on serum total Protein, Albumin and Globulin in rats treated by potassium bromate**.**

Rats treated by potassium bromate had a significant decreases in serum total Protein and albumin as compared with control positive group ($p \leq 0.05$). Meanwhile, treatment with Aqueous and alcoholic extracts of mixture and tamarind alcholic extract showed significant increases in serum total Protein, while nonsignificant increases in it showed in groups of aqueous and alcoholic extracts of roselle and tamarind aqueous extract, but all extracts treatments did not reveal any significant changes in serum total Protein compared with normal rats ($p \leq 0.05$). Aqueous and alcoholic extracts of roselle resulted in nonsignificant elevation of serum albumin and significant increases in it were observed for both aqueous and alcoholic extracts of mixture and tamarind which no significant changes as compared with normal group ($p \leq 0.05$). It coud be observed that there were no significant changes in globulin levels between all groups. ($p < 0.05$).

Table (2) : Effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on serum total Protein, Albumin and Globulin in rats treated by potassium bromate.

Parameters / Groups	Total Protein (g/dl) Mean ± SD	ALB (g/dl) Mean ± SD	GLU (g/dl) Mean ± SD
Control (-)	$6.85^{a} \pm 0.67$	$4.14^{ab} \pm 0.39$	$2.71^{a} \pm 0.26$
Control (+)	$5.59^{b} \pm 0.51$	$3.04^{d} \pm 0.28$	$2.55^{a} \pm 0.25$
40 mg/kg aqueous roselle extract	$6.53^{ab} \pm 0.6202$	$3.56^{bcd} \pm 0.35$	$2.97^{a} \pm 0.26$
40 mg/kg alcholic roselle extract	$6.16^{ab} \pm 0.59$	$3.28^{cd} \pm 0.31$	$2.88^{a} \pm 0.25$
40 mg/kg aqueous tamarind extract	$6.61^{ab} \pm 0.64$	$3.79^{abc} \pm 0.35$	$2.82^{a} \pm 0.26$
40 mg/kg alcholic tamarind extract	$7.02^{a} \pm 0.68$	$4.26^{a} \pm 0.40$	$2.76^{a} \pm 0.27$
40 mg/kg aqueous mixture extract	$6.79^{a} \pm 0.65$	$4.25^{a} \pm 0.39$	$2.54^{a} \pm 0.23$
40 mg/kg alcholic mixture extract	$6.97^{a} \pm 0.12$	$4.34^{a} \pm 0.15$	$2.63^{a} \pm 0.22$
LSD: $p \leq 0.05$	1.02	0.58723	0.43898

Mean under the same column bearing different superscript letters are different significicantly ($p \leq 0.05$).

Data presented in table (3) showed the effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on Triglycerides (TG), Total Cholesterol(TC) , HDL, LDL and VLDL and atherogenic index (AI) in rats treated by potassium bromate.

The potassium bromate treatment caused a significant decreases in serum HDL-cholesterol levels and significant rises in serum total cholesterol levels, LDL and VLDL levels when compared with negative control group values ($p \leq 0.05$). All extracts treatments showed a significant reduction in total cholesterol. As well as compared with positive group reachins to insignificant changes than that of normal rats and LDL levels for all treatments achives a significant decrease as compared with positive group and alcoholic mixture treatment was the perfect which did not signifiacantly changed than that negative group ($p \leq 0.05$). All extracts treatment showed nonsignificant decreases in Triglycerides and VLDL compared with Positive group reaching to normal group ($p \leq 0.05$). Atherogenic index for all extracts treatment achived a significant decreases for all extracts treatment reaching to normal group ($p \leq 0.05$).

Table (3) : Effect of aqueous and alcoholic extracts of roselle, tamarind and their mixture at 40 mg/kg bw daily for four weeks on Triglycerides (TG), Total Cholesterol(TC) , HDL, LDL and VLDL and atherogenic index (AI) in rats treated by potassium bromate.

Parameters / Groups	TG (mg/dl) Mean ± SD	TC (mg/dl) Mean ± SD	HDL(mg/dl) Mean ± SD	LDL (mg/dl) Mean ± SD	VLDL (mg/dl) Mean ± SD	AI (TC/HDLc) Mean ± SD
Control (-)	$93.85^{b}\pm3.39$	$114.43^{bc}\pm4.94$	$67.99^{a}\pm1.81$	$27.67^{d}\pm2.46$	$18.77^{b}\pm1.03$	$1.64^{b}\pm0.13$
Control (+)	$114^{a}\pm1.402$	$157.24^{a}\pm3.55$	$54.71^{c}\pm4.93$	$79.62^{a}\pm6.07$	$22.8^{a}\pm1.497$	$2.87^{a}\pm0.25$
40 mg/kg roselle aqueous extract	$99.88^{ab}\pm4.55$	$127.11^{bc}\pm1.01$	$69.06^{a}\pm4.897$	$38.07^{c}\pm2.91$	$19.98^{ab}\pm1.61$	$1.84^{b}\pm0.17$
40 mg/kg roselle alcholic extract	$103.43^{ab}\pm3.61$	$134.35^{b}\pm3.31$	$70.4^{a}\pm5.74$	$44.264^{b}\pm1.02$	$20.686^{ab}\pm1.81$	$1.91^{b}\pm0.17$
40 mg/kg tamarind aqueous extract	$105.77^{ab}\pm5.65$	$115.14^{bc}\pm1.89$	$59.81^{bc}\pm 3.36$	$34.176^{c}\pm1.28$	$21.154^{ab}\pm1.935$	$1.93^{b}\pm0.03$
40 mg/kg tamarind alcholic extract	$107.43^{ab}\pm4.11$	$111.82^{c}\pm1.49$	$57.639^{bc}\pm4.88$	$33.104^{c}\pm2.28$	$21.486^{ab}\pm1.95$	$1.94^{b}\pm0.18$
40 mg/kg mixture aqueous extract	$102.48^{ab}\pm3.36$	$123.58^{bc}\pm1.29$	$68.63^{a}\pm5.39$	$34.454^{c}\pm2.52$	$20.496^{ab}\pm1.931$	$1.8^{b}\pm0.17$
40 mg/kg mixture alcholic extract	$99.5^{ab}\pm2.68$	$112.09^{c}\pm5.82$	$64.69^{ab}\pm1.21$	$27.53^{d}\pm2.19$	$19.9^{ab}\pm1.34$	$1.73^{b}\pm0.05$
LSD: $p \leq 0.05$	15.885	20	7.496	5.133	2.9	0.3

Mean under the same column bearing different superscript letters are different significicantly ($p \leq 0.05$).

Discussion

The assessmentof the activities of markeror diagnostic enzymes plays a significant and well-knownrole in diagnosis, disease investigation and in the assessment of drug or plant extract for safety/toxicity risk. ALP is located in the biliary duct of the liver,is consider one of the biomarkers of the hepatocytes **(Nyblom *et al*., 2006)**.AST is normally localized within the cells of the liver, heart, gill, kidney, muscles and other organs. ALT is specific for theliver,concentration of this enzyme is related to the liver tissue and hepatic status, the change in the value of this enzyme is known as a sign of liver damage or too much pressure on liver **(Burger-Mendonca *et al*., 2008)**. The significant increase ($p \leq 0.05$) in ALP activity observed in the serum of rats fed bromate-containing diet as compared with the control may be attributable to loss of membrane components due to apossible reaction between potassium bromate in the bread samples and the membranes of liver and kidney cells, causing leakage of the enzyme into the serum. This observation was supported by **Fleischer and Schwartz (1971)** who reported that any damage done to the cell membrane may lead to leakage of ALP, which is a marker enzyme in the plasma membrane, into extracellular fluid. Increased activities of serum enzymes have been reported in conditions of tissue damage **(Hanley *et al*., 1986)**. The levels of liver enzymes ALT, AST, in the serum were lower when CCl4 treated rats are given *Hibiscus sabdariffa* calyx extract than in untreated CCl4 control is an evidence that the extract promotes healing of peroxidised liver. Administration of 250mg/kg extract was more effective in lowering the enzymes level comparing to 500mg/kg. Thus the peroxidative wound healing of the extract was not dose dependent at the concentrations used. It was earlier suggested that the extract at higher doses, and when given for a long period could be toxic **(Akindahunsi and Olaleye, 2002)**.

Pretreatment of rats with different doses of *Hibiscus sabdariffa* Calyx extract (50 and 100 mg/kg) significantly lowered serum ALT, AST and ALP in CCl4 treated rats. Hence, these data indicate that the dietary supplement of Hibiscus extract may inhibit liver damage in rats (**Adetutu and Owoade, 2013).** The protective effect of the extract could be due to the rich Vitamin C content of the extract **(Duke and Atchley, 1984)**, which serves as an antioxidant and a reductant

especially in the conversion of any ∝-tocopheroxyl radicals formed, to ∝- tocopherol **(Akanya *et al*., 1997)**. The presence of *Hibiscus* protocatechuric acid (phenol) and *Hibiscus* anthocyanins both isolated from the flower were reported to have protective effect against tart butyl hydroperoxide induced hepatic toxicity in rats **(Wang *et al*., 2000)**. It might to be possible that the calyx also contained these natural antioxidants which produced the observable effects. **Pimple *et al*., 2007** indicated the hepatoprotective Effect of *Tamarindus indica* by intoxicating the rats with paracetamol (1g/kg p.o.) for seven days. The aqueous extracts of different parts of Tamarindus indica such as fruits, leaves (350 mg / kg p.o.) and unroasted seeds (700 mg / kg p.o.) were administered for 9 days after the third dose of paracetamol. Biochemical estimations such as aspartate transaminase, alanine transaminase, alkaline phosphatase and total protein were recorded on 4th and 13th day. Liver weight variation, thiopentone-induced sleeping time and histopathology were studied on 13th day. Silymarin (100 mg /kg p.o.) was used as a standard. A significant hepatoregenerative effect was observed for the aqueous extracts of tamarind leaves, fruits and unroasted seeds ($p \leq 0.05$) as judged from the parameters studied. In this study, treating with aqueous and alcoholic extracts of roselle, tamarind and their mixture resulted in reduction of AST, ALT and ALP enzyme levels as compared with rats treated by potassium bromate. The good treatment in the level of AST found for aqueous and alcoholic extracts of mixture and tamarind alcholic extract which did not significantly different than norma rats , also unaffected in the activities AST suggests that the functions of vital organs like liver, heart and kidney are not impaired. In this study, the result showed that alcholic extract of tamarind and mixture showed perfect effect in the levels of ALP and ALT, whereas the good treatment in the level of AST found for aqueous and alcoholic extracts of mixture and alcholic tamarind extract which did not significantly different than normal rats. Extracts of roselle showed in levels of liver Enzymes non significant changes compared to control Positive group.

Total protein is a measure of all plasma proteins in the blood, The level of total protein may be affected by alteration in hepatic synthesis, protein distribution,dehydration or over hydration, and protein breakdown or excretion. **(Kolawole *et al*.,2011)**, Since albumin is the

chief protein of the plasma and other serous fluids, any effect that negatively affects albumin content would be expected to have a deleterious impact on total plasma proteins. An increase in total protein is usually the result of tissue damage **(Kolawole, *et al*.,2014)**. **Saha *et al*,(2005)** observed that a significant difference exists on the effects of different edible oils on growth performance. Any change in the concentration of serum protein and albumin indicate a change in the normal liver functions. The increased protein and albumin levels associated with the test rats indicate impairment in the normal function of the liver. With the exception of those rats fed coconut oil based diet, increases were observed in the levels of conjugated bilirubin.

Aqueous extracts of petals of red *Hibiscus sabdariffa* for human consumption becomes significant especially in the countries where there is high prevalence of elevated plasma cholesterol among the population. Previous studies have demonstrated that aqueous extract of petals of *Hibiscus sabdariffa* has blood-pressure- lowering effect in rats **(Adegunloye *et al*., 1996; Onyenekwe *et al*., 1999)** and in humans **(Haji-Faraji & Haji-Tarkha, 1999)**. However, mechanisms responsible for this effect are not clear, although reduced vascular resistance due to enhanced endothelial function and inhibition of Ca2þ influx have been proposed in rats **(Obiefuna *et al*., 1993; Owolabi *et al*., 1995)**. However, diminished endothelium-dependent vasodilatation has been observed in both clinical and experimental hypercholesterolemia **(Creager *et al*., 1992; Cooker *et al*., 1992). Hence, Treasure *et al*. (1995)** reported that agents that have the ability to lower cholesterol would reduce vascular resistance by improving endothelial function. The finding in this study that administration of aqueous extracts of *Hibiscus sabdariffa* lowers plasma cholesterol is in consonance with previous studies **(EL-saadany *et al*., 1991)**. Furthermore, the observation in the current study that administration of the extracts of Hibiscus sabdariffa caused significant increase in the plasma HDL-cholesterol levels is not comparable with other studies that demonstrated that intake of some dietary plants lower plasma LDL-cholesterol levels without affecting plasma HDL-cholesterol levels **(Ulrich, 1987)**. In hypercholesterolemic hamsters, the effect of *Tamarindus indica* rude extract from the pulp was investigated on lipid serum levels and atherosclerotic lesions. Tamarind extract has a high potential in diminishing the risk of

atherosclerosis in humans **(Martinello *et al*., 2006)**. Another experimental study on hamsters has shown that the hydroalcoholic extract of Tamarind pulp influenced the mediator system of inflammation **(Landi Librandi *et al*., 2007).** In the same time, these results seemed to agree with **Ifthekar *et al*., 2006** who find that *Tamarindus indica* rude extract from the pulp, when administered for 10 weeks, evoked a significant reduction in total cholesterol (50%), LDL (73%) and triglyceride (60%), along with an increase of high-density lipoprotein (HDL) cholesterol levels(61%), in hypercholesterolemic hamsters. In Bangladesh,fruits of *T. indica* were evaluated for their effects on the lipid profile and systolic. A diet with dried and pulverized pulp of fruits at a dose of 15 mg/kg body weight reduced the total cholesterol level (p 0.031) and LDL cholesterol level (p 0.004). Neither the body weight nor the systolic blood pressure was influenced. Only the diastolic pressure was reduced (p 0.05). In this study, all extracts treatments showed a significant reduction in total cholesterol. All extracts treatment showed nonsignificant decreases in Triglycerides and VLDL as compared with positive group reaching to normal group. Atherogenic index for all extracts treatment achives significant decreases for all extracts treatment reaching to normal group.

Recommendations

- Mixture of roselle and tamarind serve as a good cholice for health effects on liver function and lipid profile. More studies were needed to detect the perfect and safe dose of these plants to use in human.
- Focusing on more histopathological researches to determine the effects of tested plants.

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تأثير المستخلص المائي والكحولي للكركديه والتمر هندي وخليطهم على وظيفة الكبد وصورة الدهون فى الفئران المصابه ببرومات البوتاسيوم

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الملخص

تهدف الدراسة الى معرفة تأثير المستخلص المائى والكحولى للكركديه والتمر هندي وخليطهم على وظائف الكبد والقلب فى الفئران المصابه ببرومات البوتاسيوم، حيث استخدم فى هذه الدراسه ٤٠ فأر أبيض ذكور مقسمه الى ٨ مجموعات بكل مجموعه ٥ فئران، المجموعه الأولى الضابطه السالبه ثم تم معاملة باقى المجموعات ببرومات البوتاسيوم بجرعة ٢٠ ملجم/كجم من وزن الجسم مرتين اسبوعيا لمدة شهر، واحده من هذه المجموعات تم اعتبارها مجموعه ضابطه موجبه، ثم تمت معاملة باقى المجموعات بالخليط المائى أو الكحولى لكلا من الكركديه والتمر هندي وخليطهما بجرعة ٤٠ملجم/كجم يوميا اثناء فترة التجربه. فى نهاية التجربه تم تجميع عينات الدم واختبار وظائف الكبد من خلال تقدير نشاط الانزيمات ALT, AST, ALPوتقدير البروتينات الكليه ونسبة الألبيومين والجلوبيولين وتقدير مستوى دهون الدم وذلك بتقديرالجلسريدات الثلاثيه والكوليسترول الكلى والليبوبروتينات مرتفعة الكثافه والليبوبروتينات منخفضة الكثافه والليبوبروتينات منخفضة الكثافه جدا وحساب مؤشر التصلب. أظهرت النتائج أن المستخلص الكحولى من التمر هندى والخليط كان له التأثير الأفضل فى تحسين مستوى انزيمي ALP, ALT فى حين كان للمستخلصات المائيه والكحوليه من الخليط والمستخلص الكحولي من التمر هندي أفضل تأثير فى تحسين مستوى انزيم AST حيث لا توجد فروق معنويه واضحه بينهما وبين المجموعه الضابطه السالبه. مستخلصات الكركديه أوضحت عدم وجود فروق معنويه فى مستوى انزيمات الكبد بالمقارنه بالمجموعه الضابطه الموجبه. أدت المستخلصات المائيه والكحوليه من الكركديه والتمر هندي وخليطهم الى زيادة مستوى الكوليسترول الحميد وانخفاض مستوى الكوليسترول الكلي والليبوبروتينات منخفضة الكثافه جدا، معاملات المستخلصات بالدراسه اثرت بشكل ملحوظ فى مستوى الكوليسترول الكلي والجلسريدات الثلاثيه والليبوبروتينات منخفضة الكثافه جدا ومؤشر التصلب حيث لا يوجد فروق معنويه عند مقارنتها بمجموعة الفئران الطبيعيه. أفضل المعاملات فى تحسن مستوى الكوليسترول الحميد كانت عند المستخلص المائي للخليط والمستخلص الكحولى للكركديه بيما كانت أفضل المعاملات على صورة الدهون عند المستخلصات المائيه والكحوليه للخليط. من الجدير بالملاحظه عدم وجود فروق معنويه بين المستخلصات المائيه والكحوليه فى النوع الواحد من النباتات المختبره والخليط . الخليط من التمر هندي والكركديه له تأثير جيد فى تحسين وظائف الكبد وصورة الدهون ونحتاج لمزيد من الدراسات لتوضيح أفضل تأثير وتوضيح الاستخدامات الامنه لهذه النباتات.