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Study the Potential Effect of MulberryLeaves and Fruits on Experimental Animals Infected with Hyperlipidemia

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The main objective of the study is to know the effect of mulberry leaves and fruits at different concentrations to protect against high blood fat, where 45 varieties of albino were used, weigthing 140 - 180g. The rats were divided into 9 groups (5 mice in each group), one of which was the negative control group.as for the rest of the eight groups, 2% of cholesterol was added for a period of 15 days, one of these groups as a positive control group, the other groups were fed on mulberry leaves 2.5 - 5-7.5%, and groups also fed berries with a ratio of 2.5 - 5 - 7.5%. of mulberry leavesand the last group, a blood lipid-lowering drug was added, and the trial lasted for two months, and was estimated B.W.G% &FER, total cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density, very-low-density cholesterol, glucose, kidney and liver functions.

The results showed a remarkable decrease in kidney and liver functions, low total and low density lipoprotein cholesterol, a rise in high-density lipoprotein cholesterol and a significant decrease in blood glucose levels, especially in groups that fed mulberry leaves and fruits at a concentration of 7.5%

Introduction

Cardiovascular disease (CVD) is one of the most common causes of deaths,with about 17 million people die of CVD every year worldwide (**Townsed*et al.*,2016 andMa*et al.*,2016).** It is estimated that CVD will continue to be the largest contributor to global mortality in the future (**Lu*et al.*,2016).**

Hyperlipidemia is one of the most important risk factors for CVD (**Nussbaumerov**a **and Rosolova**,**2018).** Therefore, an increasing focus has been reported in research studies that determine the effectiveness of

natural alternative medicine in reducing blood lipid levels (**Yang*et al.,2010*).**

This is because majority of the hypolipidemic drugs can potentially cause side effects and they are expensive (**Yang*et al.*,2010).**

Hyperlipidemia is condition in which there is an elevated serum levels of one or more of total cholesterol ,low density lipoprotein cholesterol ,very low density lipoprotein cholesterol or both total cholesterol and triglycerides.

Hyperlipidemia is life style disorder which seriously disturbs the human health

It leads to various cardiovascular disorders like angina pectoris, hypertension, atherosclerosis myocardial infraction, congestive heart failure**(Grundy,1986)**

The main cause of hyperlipidemia includes changes in life style habits, poor diet,high cholesterol life style contributors include obesity,poor physical activity and smoking other factors include diabetes, kidney disease,pregnancy and underactive thyroid gland **(Chen and Li 2007)**

American heart associatiojn defined hyperlipidemia is a high level of fats in the blood.These fats called lipids include cholesterol and triglycerides,There are different of hyperlipidemia depending on which lipid levels are high in the blood **(Kishor Jain *et al*.,2007) .**

Natural products have always been rich source of biologically active compounds (**Maand Zhang 2017,Zhang and Ma 2018).**

Medicinal plants have always been considered as a healthy source of life for all people due to its rich therapeutic properties and being 100% natural.

Medicinal plants are widely used by the majority of populations to cure various diseases and illness and have ahigh impaction the world's economy **(Edeoga *et al*.,2005) .**

However, the risk of hyperlipidemia would be reduced by consumption of flavonois,antioxidants phytochemicals and polyphenols such as mulberry .mulberry are important dietary sources of fibre and essential vitamins and minerals. They also contain a vest number of other phytochemicals for which there are no known deficiency conditions but which may have marked bioactivities in mammalian cells of potential health benefit. Extracts of these fruits act effectively as free radical in hibitors**. Mia *et al*.,(2002)** found that fiber content of mulberry may play an important role in plasma lipids, particularly solube fiber decrease serum total cholesterol and serum LDLc without significant alteration in serum HDLc and triacylgle.

Mulberry fruits possess several potential pharmacological properties including anti-cholesterol, anti-diabetic anti-oxidative and

anti-obesity effects (**Ye *et al* 2002**, **Kang *et al* 2006, Zhangand Shi 2010**).these pharmacological properties are due to the presence of polyphenol compounds including anthocyanins. However ,different colours of mulberry fruits even from the same species may have different a mounts of anthocyanins **(Gerasopoulos and stavroulakis1997).**

The antioxidant activity of mulberry leaves has also been reported by(**Doi and Fujimoto (2000)** who reported that 1- butanol extract of mulberry leaves scavenged the DPPH radical and inhibited the oxtidative modification of rabbit and human LDL. Five flavonol glycosides (rutin , isoquercitrin , quercetin 3-(6- acetylglucoside) have been reported in mulberry leaves mulberry plants contain a wide array of free radical scavenging molccules, such as flavonoids that have antioxidant and hypolipidemic activities(**Chen*et al* .,2005 and Choudhary *et al* 2005).**

Materials and methods

Materials

Mulberry leaves and fruits which is popular in some localities of Egypt,were purchased freshly from local Farm at Shibin El Kom Menofiya Governorate,also, cholesterol as pure chemical fine used for inducing hyperlipidemia in rats.was obtain from El Gomhoria company.

A total number of 45 albino rats were purchased from Bio-diagnostic Co,Gize,Egypt.

Methods

Preparation of fruits and leaves mulberry:

Collection leaves and fruits and washed and dried under vacuumto maintain active compounds and saved it in glass ware sealed until used .

Animals and Experimental Design:

The work was carried out at the faculty of Home Economics,Menofia University Egypt .forty five male albino rats were fed astandard diet according to **Ain,1993** for 7days as an adaptation period as normal control group while other rats were subjected to intraperitoneal injection of cholesterol 1.5 %mg/kg .

The animals (45 rats) were distributed in to 9 groups (n=5) according to the following scheme normal control (5 rats) fed basal diet.

While hyperlipidemia rats (35) were classified in to hyperlipidemia control (2.5,5,7.5%) mulberry fruits and (2.5,5,7.5%) mulberry leaves ,and rats take drugs.

Feed intake was calculated daily and rats were weighed weekly. Feeding and growth performance were carried out by determination of feed intake, body weight gain and feed efficiency ratio (FER) according to **Chapman *et al.,* (1959)** using the following formulae:

$$FER = \frac{\text{Body weight gain (g)}}{\text{Food intake (g)}}$$

$$\text{Body weight gain (BWG\%)} = \frac{\text{Final weight – initial weight}}{\text{Initial weight}} \times 100.$$

Blood samples were collected after 12 hours fasting at the end of the experiment (4 weeks). Using the retro-orbital method by means of a micro capillary glass tubes, blood was collected into a dry clean centrifugal tube and left to clot in a water bath (37°C) at room temperature for half an hour. The blood was centrifuged for 10 minutes at 3000 rpm to separate the serum apart of was subjected to glucose determination and the reminder was carefully aspirated and transferred into clear quit fit plastic tubes and kept frozen at (-20°C) until analysis.

Chemical Analysis:

Moisture, protein, fat, fiber and ash contents of mulberry fruits and leaves were determined according to methods described by the ***A.O.A.C.*** **(2O10).**

Biochemical Analysis:

Serum glucose and serum insulin were estimated according to **Asatoor and King,(1954)and Wilson and Miles, (1977).**

Serum total cholesterol, triglyceride (TG) and high-density lipoprotein cholesterol (HDLc) were determined by using enzymatic colorimetric methods of (**Allain, 1974.*;* Fassati and Prencipe, 1982 Schmidt-sommerfeld, (1981),** respectively. The determinations of low-density lipoprotein cholesterol (LDLc) and very low-density lipoprotein cholesterol (VLDLc) were carried out according to the method of **Lee and Nieman, (1996)** as follows:

VLDLc = TG/5 and LDL_C= Total Cholesterol – HDLc +VLDLc.

Serum aspartate and alanine amino transferases (AST, ALT) were determined by using enzymatic colorimetric method **(Bergmeyer and Harder, 1986 and Kachmar and Moss, 1976.**Determination of serum creatinine and urea **Bartles*et al*., 1972 and Barham and Trinder, 1972** respectively.

Statistical Analysis:

Statistical analysis was performed by using computer program, Statistical Package for Social Science and compared with each other using the suitable tests **(SPSS,1998).**

Results and Discussion

Data in table (1) showed the chemical composition activity of dried fruits and leaves of mulberry. Data revealed that mulberry fruits and mulberry leavescontains (9.0 and 8.48) carbohydrate, (1.28 and

3.16%) protein (49.0and33.0) fat , (86.63 and 81.14%) moisture, (1.03 and 4.25) Ash , (1.57 and 2.64) fiber respectively.

Table (1): Chemical composition of dried mulberry leaves and fruits

Chemical composition	Carbohydrates	Protein	Fat	Moisture	Ash	Fiber
Mulberry fruits	9±1.13	1.28±0.18	.49±0.23	86.63±3.16	1.03±0.38	1.57±0.45
Mulberry leaves	8.48±0.11	3.16±0.51	.33±0.23	81.14±2.18	4.25±0.65	2.64±0.12

Values when each 3 samples.

Ke Yi-Fu, (1997) stated that mulberry contain 85% water (moisture) , 0.36% protein , free acid 1,86% invertsugar 9.19% ,crude fiber 0.91% ,Ash 0.66%

The fruit also rich in carotene, vitamin B2 ,phenolics .

Butt *el al.*,(2008)stated that mulberry leaves contain on dry weight 5.31% protein, 2.09 % fat, 9.9% crude fiber ,27.6% dietary fiber, 11.3% Ash previous studies have shown that leaves and dark fruits are the richest in bioactive compounds (**Sanchez *et al* 2015and Jiang and Nie 2015).**

1 Feed efficiency ratio

Data in table (2) show the mean value of feed intake,body weight gain % and FER for normal and hyperlipidemia rats. It is clear that feed intake value was a higher significantly increased ($p \leq 0.01$) in control (-) group compared with control (+) group . The consumption of mulberry leaves 7.5 % and 2.5, 5, 7.5 % mulberry fruits showed no- significant differences as compared with the control (+). in contrast the consumption mulberry leaves 2.5,5 % and drug show significantly increase ($p \leq 0.05$) compared with control (+) group . Body weight gain (BWG) for control (-) was a significantly increase ($p \leq 0.001$) compared with control (+) group. The consumption of mulberry leaves 5% and 5&7.5 % mulberry fruits showed a significant decrease ($p \leq 0.05$) as compared with to control (+) group. On the other side rats take drug showed a significant ($p \leq 0.01$)as compared to control (+) .Feed efficiency ratio (FER) for control (-) showed a highly significant increase ($p \leq 0.01$) compared with control (+) groups. The consumption of mulberry leaves and fruits (5&7.5 %) anddruge showed a significant increases ($p \leq 0.05$) when compared with control (+) group.On the other side consumption 2.5 mulberry leaves and fruits showed no significant as compared with control (+) group.

Table (2): Effect of mulberry leaves and fruits on feed intake, body weight gain (%) and fee efficiency ratio (FER) of hyperlipidemia rats

Parameters / groups	Control -ve	Control+ ve	Mulberry leaves			Mulberry fruits			drag
			2.5%	5%	7.5%	2.5%	5%	7.5%	
Body weight gain(g)	$16.09^{\pm}$ 1.14^{***}	$5.23^{\pm}$ 0.33	$7.71^{\pm}$ 0.26	$9.14^{\pm}$ 0.75^{*}	$8.91^{\pm}$ 0.15	$7.82^{\pm}$ 0.25	$10.95^{\pm}$ 1.28^{*}	$10.17^{\pm}$ 1.14^{*}	$11.48^{\pm}$ 1.72^{**}
Feed intake (g)	$14.93^{\pm}$ 1.12^{**}	$11.28^{\pm}$ 1.55	$12.18^{\pm}$ 1.10^{*}	$12.51^{\pm}$ 0.69^{*}	$11.13^{\pm}$ 0.82	$11.25^{\pm}$ 0.11	$11.81^{\pm}$ 1.19	$11.88^{\pm}$ 1.36	$12.38^{\pm}$ 1.44^{*}
FER	$0.075^{\pm}$ 0.001^{**}	$0.026^{\pm}$ 0.002	$0.032^{\pm}$ 0.001	$0.053^{\pm}$ 0.002^{*}	$0.049^{\pm}$ 0.002^{*}	$0.044^{\pm}$ 0.002	$0.066^{\pm}$ 0.001^{*}	$0.055^{\pm}$ 0.001^{*}	$0.066^{\pm}$ 0.001^{*}

* Differences are significant at P<0.05 **Differences are highly significant at P<0.01
***Differences are highly significant at P<0.001

The results are agreement with **(Mohamed 2001)** who found that food intake of negative control rats was significantly higher ($p \leq 0.05$) than negative group.

(**Lim *et al*.,2013)**reported that high fat diet –induced obese mice fed with acombination of mulberry leaf extract and mulberry fruits extract at low and high doses had a significant decrease in body weight gain. The high does of combination of mulberry leaf extract and mulberry fruit extract had significantly improved the glucose control**.**

Data in table (3) show the mean values of serum lipids patterns of normal and hyperlipidemia groups. The value of cholesterol of to control (-) group showed a highly/significantdecrease ($p \leq 0.001$) as compared to control (+) group .The consumption of mulberry leaves (7.5 %) and drug showed significantly decrease ($p \leq 0.01$) when compared control (+) group, on the other side consumption mulberry leaves 2.5 % and mulberry fruits 2.5 , 5 % showed no significantly as compared to control (+) group . The value of triglyceride of control (-) showed a highly significant decrease ($p \leq 0.01$) when compared to compared to control (+) group. The consumption of mulberry leaves and fruits 7.5 % and drug showed significantly decrease ($p \leq 0.01$) when compared to control (+) group, on the other side consumption of mulberry leaves and fruits 5% showed significantly ($p \leq 0.05$) as compared with control (+) group. The value of HDLc of control (-) showed a highly significant increase ($p \leq 0.001$) as compared with control (+) group. The consumption of mulberry fruits 7.5 % and drug showed significantly increase ($p \leq 0.01$) when compared to control (+) group while consumption mulberry leaves 7.5 % and mulberry fruits 5% showed significantly ($p \leq 0.05$). The value of LDLc of control (-) group showed highly significant decrease ($p \leq 0.001$) as compared with control (+)

group. The consu a significant decrease ($p\leq0.01$) when compared to control(+)while consumption mulberry leaves and fruits showed significant ($p\leq0.05$) as compared with control (+) group. The value of VLDLc of control (-) showed decrease significant ($p\leq0.01$) when compared with control (+) group. The consumption of drug showed a highly significant decrease ($p\leq0.01$) as compared to control (+) group while consumption of mulberry leaves 5, 7.5 % and mulberry fruits 7.5 % showed significant ($p\leq0.05$) control (+) group.The result agree with **Yang *et al* .,2010** reported that rat fed with high fat diet supplemented with 5% or 10% mulberry fruits powder had asignificant decrease in the concentration of serum and liver triglyceride,total cholesterol and serum LDL cholesterol.

Table (3): Effect of mulberry leaves and fruits on lipid profilefor normal and hyperlipidemia rats.

parameters / groups	control -ve	control +ve	Mulberry leaves			Mulberry fruits			drug
			2.5%	5%	7.5%	2.5%	5%	7.5%	
T.CH Mg/dl	95.26$^{\pm}$ 1.16***	168.48$^{\pm}$ 3.45	132.74$^{\pm}$ 2.19	130.37$^{\pm}$ 1.77*	123.66$^{\pm}$ 1.11**	142.41 $^{\pm}$5.23	137.53$^{\pm}$ 3.26	132.21$^{\pm}$ 2.15*	114.72$^{\pm}$ 5.31**
T.G Mg/dl	64.28** 2.84$^{\pm}$	98.51$^{\pm}$ 3.11	84.79$^{\pm}$ 2.62	80.21$^{\pm}$ 1.52*	75.65$^{\pm}$ 1.37**	82.4 $^{\pm}$1.24	81.92$^{\pm}$ 2.33*	79.82$^{\pm}$ 3.68**	71.86$^{\pm}$ 1.12**
HDL Mg/dl	52.56$^{\pm}$ 1.15***	33.23$^{\pm}$ 2.77	36.63$^{\pm}$ 1.42	40.83$^{\pm}$ 1.19	43.22$^{\pm}$ 1.42*	40.37$^{\pm}$ 1.64	43.31$^{\pm}$ 2.35*	46.31$^{\pm}$ 1.49**	48.11$^{\pm}$ 1.75**
VLDL Mg/dl	12.85$^{\pm}$ 1.08 **	19.70$^{\pm}$ 1.71	16.95$^{\pm}$ 1.11	16.04$^{\pm}$ 1.52*	15.13$^{\pm}$ 1.23*	16.4 8$^{\pm}$ 1.16	16.38$^{\pm}$ 1.44	15.96$^{\pm}$ 1.28*	14.73$^{\pm}$ 1.33**
LDL Mg/dl	55.55$^{\pm}$ 1.12***	155.31$^{\pm}$ 3.54	112.78$^{\pm}$ 5.26	105.58$^{\pm}$ 3.18*	95.57$^{\pm}$ 1.78**	118.16$^{\pm}$ 3.11	110.60$^{\pm}$ 2.58*	101.86$^{\pm}$ 3.55**	80.98$^{\pm}$ 1.58**

* Differences are significant at $P\leq0.05$ **Differences are highly significant at $P\leq0.01$
***Differences are highly significant at $P\leq0.001$

An increase in the serum high – density lipoprotein (HDL)cholesterol was reported in rat fed with high fat diet supplemented with 5% or 10% mulberry fruit powder**(Yang *et al*., 2010).** It is suggested that the presence of dietary fiber in mulberry fruits in hibits the hepatic lipogenesis and increases LDL-receptor activity (**Venkales and Devaraj 2003) .**In addition , the authors suggested that mulberry fruits might have ahypolipidemic effect because mulberry fruits have high content of dietary fiber and linoleic acid**(Yang *et al* .,2010)**.

Data in table (4) showed the value of AST& ALT& Urea and creatinine for normal and hyperlipidemia rats. Levels of a Sparta amino transferees(AST) in control (-) showed highly significant decrease ($p\leq0.01$) as compared with control (+) group.The consumption of

mulberry leaves 7.5 % , mulberry fruits 5,7.5 % and drug showed a significant decrease ($p \leq 0.001$) as compared with control (+) group, while consumption of mulberry leaves 2.5 ,5 % and mulberry fruits 2.5 % showed a significant decrease ($p \leq 0.05$) as compared with of control (+)group.. The value of alannamino transferees (ALT) in control (-) group showed highly significant decrease ($p \leq 0.001$) as compared with control (+) .The consumption of mulberry fruits 7.5 % and drug showed highly significant decrease ($p \leq 0.001$) as compared with control (+) group while consumption of mulberry leaves (2.5, 5, 7.5) % and mulberry fruits 2.5% showed significant ($p \leq 0.05$) as compared with control (+) group. The value of urea in control (-) showed highly significant decrease ($p \leq 0.001$) as compared with control (+) group. The consumption of drug showed significant decrease ($p \leq 0.01$) compared with control (+) group while consumption of mulberry leaves and fruits 5,7.5 % showed significant ($p \leq 0.05$) as compared with control group. The value of creatinne urea in control (-) showed highly a significant decrease ($p \leq 0.001$) when compared with control (+) group. The consumption of drug showed highly significant decrease ($p \leq 0.001$) compared with control (+) group, while consumption of mulberry fruits 7.5 % showed a significant ($p \leq 0.01$) as compared with control (+) group

Table (4): Effect of mulberry leaves and fruits on AST,ALT,Urea and creatinnefor normal and hyperlipidemia rats.

parameters / groups	Control -ve	Control +ve	Mulberry leaves			Mulberry fruits			drug
			2.5%	5%	7.5%	2.5%	5%	7.5%	
AST	31.34±	53.62±	42.08±	41.25±	36.52±	41.03±	38.99±	34.3±	35.1±
(□/l)	1.16**	3.77	2.11*	1.38*	1.85*	2.75*	1.08**	1.23**	1.13**
ALT	31.28±	50.22±	41.71±	38.99±	38.14±	40.01±	36.69±	33.73±	32.61±
(□/l)	1.42***	1.31	1.06*	1.11*	1.84*	2.19*	1.33**	1.51***	2.27***
Urea	40.39±	56.86±	53.01±	46.16±	45.01±	52.02±	49.92±	48.62±	43.3±
(mg/dl)	2.16***	3.56	4.37	2.15*	1.11*	3.33	2.19*	2.83*	1.49**
Creatinne	0.68±	1.47±	1.18±	0.86±	0.81±	1.12±	0.82±	0.78±	0.75±
(mg/dl)	0.01***	0.08	0.01	0.02*	0.01*	0.06	0.03*	0.02**	0.02***

* Differences are significant at P≤0.05 **Differences are highly significant at P≤0.01 ***Differences are highly significant at P≤0.001

Li *et al.*, 2016 reported that rats fed with mulberry fruit marc anthocyanins had adecrease in the leaves of ALT, aspartate amino transferase ,collagen type III hyaluroidase acid and hydroxyproline.**Hussein *et al.*, (2010)** studied the liver protective effect of mulberry and calendula officinalis extracts against hepatotoxicity induced by CCL4 induced toxicity inisolated rat hepatocytes mulberry

reduced the levels of alanine aminotransferase (ALT) , (AST) and LDH and maintained the integrity of isolated hepatocytes.

Wang *et al.*,(2011) reported that mulberroside A shows uricosuric and nephroprotective effects. In hyperuricemia mice it decreases the serum level of urea nitrogen, creatinine, urinary Nacetyl β-D-glucosaminidase action, albumin, β_2 βmicroglobulin and enhanced the creatinine clearance Further research is required in order to explore the nephroprotective constituents in M. alba.They also conducted an experimental study on rabbits to evaluate the nephroprotective effect of *M. alba* against isoniazid induced nephrotoxicity. Parameters used for the analysis of nephrotoxicity were blood urea nitrogen and creatinine along with histopathological studies. It wasreported that creatinine and urea clearance are the primary
functions of glomerulus **(Garba *et al*., 2011).**

Data showed that Fasting serum glucose (mg/dl) for different groups of hyperlipidemia rats fed on leaves and fruits of mulberry in table (5).

Serum glucose in control (-) showed highlysignificantly decrease ($p \leq 0.001$) as compared with control (+) group.The consumption of drug showed a significant decrease ($p \leq 0.001$)as compared with control (+) group while consumption of mulberry leaves (2.5,5,7.5)% and 7.5% mulberry fruits showed significant decrease ($p \leq 0.05$) as compared with positive group. However no significant decresed in glucose in group 2.5, 5 % mulberry fruits.The result agree with**Wang *et al*., (2013)** reported that diabetic rats fed with ethyl acetate –soluble extract of mulberry fruits for 2 weeks had a significant decrease in the levels of fasting blood glucose and glycosylated serum protein. Similar findings were also reported by **Guo *et al*.,(2013)**who found that diabetic rats fed with mulberry fruit poly saccharides for 2 weeks had adecrease in fasting blood glucose.

Table (5): Effect of mulberry leaves and fruits on serum glucose for normal and hyperlipidemia rats.

parameters / groups	Control - ve	Control + ve	Mulberry leaves			Mulberry fruits			drug
			2.5	5	7.5	2.5	5	7.5	
Glucose (mg/dl)	87.77 $^{\pm}2.15^{***}$	135.75 $^{\pm}5.85$	110.64 $^{\pm}3.19^{*}$	108.85$^{\pm}$ 6.32*	108.39 $^{\pm}2.13^{*}$	124.38 $^{\pm}3.54$	117.59$^{\pm}$ 2.77	107.2$^{\pm}$ .38*	105.3$^{\pm}$ 1.33**

* Differences are significant at $P \leq 0.05$ **Differences are highly significant at $P \leq 0.01$
***Differences are highly significant at $P \leq 0.001$

References

A.O.A.C.(2005): Offical Methods of the Association of official AnalyticalChemists.15th ed.AOAC 2200 Wilson boulevard arling,Virginia,22201,USA.

Ain .(1993): Purified diet for laboratory :Final Report. American institute of Nutrition .J.Nutrition ,123:1939-1951.

Allain, C.C. (1974):Cholesterol enzymatic colorimetric Method .J.of Clin. Chem,20:470.

Asatoor, A.M. and King,E.J. (1954):Simplified colorimetric blood suger method.Biochem.J.,56 (14):492-501.

Barham, D. and Trinder,P.(1972) : Determination of Uric acid Analyst,97:142.

Barles,J.;Bohmer,M. and Heirli, C.(1972): Determination of Creatinine .J.Clin.Chem, Acta,37:193.

Bergmeyer, H.U and Harder,M.(1986) : A colorimetric method of the determination ofserum glutamic oxaloacetic and glutamic pyruvic transaminase Cline .Biochen,24:481 -486.

Butt, M.S; Nazir,A;Sultan,m.T.and Schoen(2008): Mours alba l.Nature's Functional Tonic (Trends in Food Science and Technologylg, (10): 505-12.

Champman,D.C; Castilla,R.and Campbell,J.A.(1959) : Evaluation of protein in food:A method for the determination of protein efficiency ratio.Can.J.Biochem.Physiol.,37:679-688.

Chen,J. and Li,X. (2007): HYPOLIPIDEMIC effect offlavonoids from mulberry leaves in triton WR- 1339 in duced hyperlipidemic mice ,Asia pacific Journal of Clinical Nutrition, 16: 290- 294

Chen,L.;Liu, J.;Hsu, H .;Huang, M.Y. and Wang ,C. (2005) : Mulberry extract inhibits the development of atherosclerosis in cholesterol – fed rabbits .Food Chemistry , 91:601 -607.

Choudhary, S.N.; Jalil, S.; Alam, J.M. and Rahman,A. (2005) : Effects of ethanolic extract of *Iris germanica* on lipid profile of rats fed on high – fat diet.Journal of Ethnopharmacology , 98: 217 -220 .

Defronzo,R.A. and Ferrannini,E. (1991): Insulin .A multifaceted syndrome responsible for NIDDM.obesity hypertension ;dyslipidemia , and atherosclerotic cardiovascular disease .Diabetes Care, 14:173-194.

Doi, T.K.and. Fujimoto, Y.(2000) : Mulberry leaf extract inhibits the oxidative modification of rabbit and human low density lipoprotein . Biol.Pharm .Bull.,23; 1066 -1071 .

Ebbert,J.O. and Jensen,M.D. (2013) :Fat depots,free fatty acids ,and dyslipidemia. Nuttrients, 5: 498-508.

Edeoga,H.O.;Okwu,D.E. and Mbaebie,B.O.(2005):phytochemical constituents of some Nigerian medicinal plants.Afr Biootechnol;4:685-688.

Fassati,P.and Prencipe,l. (1982):Determination of triglyceride .J.Clin.Chem.,28;2077.

Garba, U.M.; AK. B .Sackey.;RLS .Agbede.;L.B Tekdek and M. Bisalla. (2011): Serum urea and creatinine levels in Nigerian local horses naturaly infected with Babesia .pak. Vet. J., 31: 163 – 165 .

Gerasopoulos,D, and Stavroulakis,G .(1997) : Quality Characteristics OF for mulberry (*Morus sp*) Cultivars in the area of Chaina .Greece.J,Sci,Food Agrie, 73:261-264.

Grundy,S.M. (1986): Cholesterol and coronary heart disease a new era journal of American Medicine,256:2849.2858.

GuoC.;Li,R.;Zheng,N.;Xu,L. and Liang,T,He,Q (2013) : Anti-diabetic effect of Ramulus Mori polysaccharides isolated from Morus alba L,on STZ-diabetic mice through blocking inflammatory response and attenuating oxidative stress. Int. Immunopharmacol 2013,16,93-99.

Hussein,M.S.;O.S.Eltawil.;N.E.H Yassin and K.A.ABDOU. (2010): The protective effect of *Mors alba* and *Calendula officinalis* plant extracts on carbontetrachloride.induced hepatotoxicity in isolated rat hepatocytes J.Amer. Sci.,6: 762 – 773.

Jiang,Y., and Nie ,W.J.(2015) : Chemical properties in fruits of mulberry species from the xinjiang province of china (Food Chemistry), 174: 460-6.

Kachmar,J.F. and Moss,D.W.(1976): Enzymes ,IN Fundamentals of Clinical Chemistry (edited by Tieze N) pp.666-672,Philadelphia PA.W.B.Saunders CO.

Kang, T.H.;Hur.;J.Y.;Kim,H.B.;Ryu,J.H and Kim,S.Y. (2006) : Neurotective effects of the cyaniding-3-O-beta-D-glucoty

ranoside isolated from mulberry fruits against cerebraral is chemia ,Neurosci.let,391: 122-126.

Ke,Yi-Fu.(1997): mulberry cultivation and Breeding in china. Japanese Journal of Breeding ,33(3) :337-340.

Kishor, J.S.;Kathivarin,M.K.;Rahul,S. and chamanal,J.(2007): Biology and chemistry of hyperlipidemia, Bioorganic and Medicinal Chemistry, 15: 4674- 4699.

Lee,R.and Nieman,D.(1996): Nutritional Assessment. 2nd Ed.,Mosby,Missouri,USA.

Li,Y.; Yang, Z.; Jia, S. and Yuan, K. (2016): Protective effect and mechanism of action of mulberry marc anthocyanins on carbon tetrachloride – induced liver fibrosis in rats.Funct. Food, 24: 595-601.

Lim,H.H.; Lee,S.O.;Kim,S.Y.;Yang,S.J. and Lim, Y. (2013) :Anti-inflammatory and antiobesity effects of mulberry leaf and fruit extract on high fat diet –induced obesity .Exp. BIOL .Med, 238:1160-1169.

Lu, H.; Pan, W.-Z .; Wan, Q.; Cheng , L. l., Shu,X-H.; Pan, C.-Z.;Qian,J-Y and Ge,J.(2016): B0Trendsin the prevalence of heart diseases over a ten – Year Period from signle – center observations based on a large echo cardio graphic data base.J.Zhejiang Tlio .Sci .B,17:54.59.

Ma,Z.F and Lee,Y.Y. (2016): Virgin coconut oil and its cardiovascular health benefits. Nat, Commun. 11:1151-1152.

Ma,Z.F. and Zhang, H. (2017):Phytochemical constituents, health benefits, and industrial applications of grape seeds : Amini-review Antioxidants 6:71.

Mia ,M.A.;Siddiqui ,M.N.;Haque , M.S,;Islam, M.N.;Rukunzzaman ,M.and Deb,K. (2002) : Dietary fibre and coronary heart disease .Mymensingh Med .J. 11(2) : 133-135 .

Mohamed,S.M.(2001): Head of cabbage, cauliflower and lettuce reduce blood glucose among diabetic rats J .of Home Economics – Minufiya Univerity , 11 (4): 163 -179 .

Nussbaumerova,B. and Rosolova,H.(2018): Epidemiology of hypercholesterolemia.Vnitr lek.,64(1):30-37.

Sanchez-Salcedo,E.M.;Mena,P.;Garcia –Viguera,C;Hernandez,F. and Martinez J.J .(2015): Polyphenolic compounds and antioxidant activity of white and black mulberry leaves. Their

potential for new products rich in phytochemicals journal of Functional Foods, 18: 10 39- 46.

Scmidet- sommerfled, E.D.(1981): The influence of maternal fat metabolism on fetal carnitine levels . Early H um. Dev,5233.

SPSS (1998): Statistical pakage for Social Science .Computer Software ,Ver. 10., SPSS Company, LONDON,uk. The biology and Chemistry of Hyperlipidemia Bioorganic and Medicinal chemistry .15:4674-4699.

Townsed, N.; Wilson,l.;Bhatnagar,P.; Wickrama Singhe,K.;Rayner,M and Nichols,m . (2016):Cardio Vascular disease in EUROPE: Epidemiological up data Eur- Heart-2016, 37:3232- 3245.

Venkatesan S.N and Devaraj, H. (2003) : Increased binding of LDL and VLDL to apo B,E receptors of hepatic plasma membrane of rats treated with Fibernat .Eur .J.Nutr. 42,262-271.

Wang,X.; Xiang,L.; Wang,C.; Tang, C and He,X. (2013): Polyphenols contents and antioxidant capacity of 68 chines herbals suitable for medical or food uses Food Res 41,363-370.

Wang .C.P.;Y.Wang.;X .Zhang J.F. Ye, ls.Hu and LD. Kong . (2011) :mulberro side Apossesses potent Uricosuric and nephrotective effects in hyperuricemice , plantamed , 77:686 – 794 .

Wilson,A.M. and Miles,L.E.M.(1977) : Radio Immuno Assay of Insulin –in Hand Book of Radioimmunoassay .G.E.Abraham.Ed.,Inc .New York,P.275.

Yang,X.; Yang,l and Zheng, H. (2010a) :Hypolipidemic and antioxidant effects of mulberry hyperlipidemia rats food chemo toxicol.2010,48,2374-2379.

Yang,Y.; Zhang,T.; Xiao,L.;Yang ,L. and Chen ,R. (2010b): Tow new chalcones from leaves of mours alba L.fitoterapia 81,614-616.

Ye,F.;Shen,Z. and Xie ,M. (2002) : Alpha-glucosidase inhibition from a Chinese medical herb (Ramulus mori) in normal and diabetic rats and mice. Phytomedicine, 9:161-166.

Zhang,H. and Ma ,Z.F. (2018) :Phytochemical and pharmacological properties of *Capparis sqinosa* as a medicinal plant. Nutrients, 10:116.

Zhang ,Z. and Shi,L . (2010) : Anti- inflammatory and analgesic properties of cis- mulberroside a from *Ramulus mori*-fitoterapia 81: 214-218.

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دراسة التأثيرالمحتمل لأوراق وثمارالتوت على حيوانات التجارب المصابة بارتفاع دهون الدم

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الملخص العربي:

الهدف الرئيسى من الدراسة هو معرفه تأثير اوراق وثمار التوت بتركيزات مختلفة للحماية ضد ارتفاع دهون الدم 0 تم استخدام 45 فار من النوع الالبينو يتراوح وزنها (140 – 180) جم تم تقسيم الفئران الي 9 مجموعات (5 فئران فى كل مجموعه) احداهما المجموعة الضابطة السالبة اما باقى المجموعات الثمانيه تم اضافه 2 % من الكوليسترول لمده 15 يوما احدى هذه المجموعات كمجموعه ضابطه موجبه والمجموعات الاخرى تغذت علي اوراق التوت بنسبه (2.5- 5-7.5) % و مجموعات تغذت ايضا علي ثمار التوت بنسبه (2.5 -5- 7.5) % والمجموعة الاخيرة تم اضافه عقار خافض لدهون الدم واستمرت التجربة لمده شهرين وتم تقدير كلا من FER&B.W.G% والكوليسترول الكلي وثلاثى الجلسريد والكولسترول عالي الكثافة والكولسترول منخفض الكثافة ومنخفض الكثافة جدا والجلوكوز ووظائف الكلي و الكبد0

قد اوضحت النتائج انخفاض ملحوظ في وظائف الكلي والكبد و انخفاض الكوليسترول الكلي ومنخفض الكثافة وارتفاع في الكوليسترول عالي الكثافة وانخفاض مستويات الجلوكوز في الدم بشكل ملحوظ وخاصه في المجموعات التي تغذت على اوراق وثمار التوت بتركيز 7.5 %.