Potential Effect of Loquat (*Eriobotrya Japonica*) on Hypercholesterolemic Rats

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ABSTRACT

This study aimed to evaluate the potential effect of loquat (*Eriobotrya japonica*) on hypercholesterolemic rats. Thirty-five adult male rats (Sprague Dawley strain), weighing about 180±10 g were separated into two groups. The 1st group, rats (n=7), was fed on a basal diet and kept as a negative control group. The 2nd group : (hypercholesterolemic rats), (n=28), fed on a hypercholesterolemic diet (high-fat diet (HCD) group). After induction the rats were divided into four subgroups as follows: Subgroup 1 served as the control positive group and 2, 3 and 4 treated rat subgroups were fed on HCD and a diet supplemented with 2.5%, 5% and 7% of dried loquat fruit, respectively. Results revealed that hypercholesterolemic rats treated with 2.5%, 5% and 7.5% of dried loquat fruit caused a significant improvement in body weight and reduced the weights of the heart, lung, liver, kidney, and spleen ,accompanied by a significant decrease in levels of lipid profile as well as in liver functions (ALT, AST and ALP), kidney function (urea, creatinine and uric acid), while These treatments recorded a significant increase in a high-density lipoprotein-cholesterol (HDL-C). In addition, significantly reduced malondialdehyde (MDA) was significantly reduced, while superoxide dismutase (SOD) activity was significantly ($P<0.05$) increased. In conclusion, loquat fruits demonstrate substantial health potential, exhibiting antihyperlipidemic, anti-hepatic liver, kidney and anti-oxidative stress properties. It also, offers opportunities for the development of functional foods or dietary supplements with potential health benefits.

Keywords: *Eriobotrya Japonica*, Hyperlipidemia, Antioxidant, Functional foods, Rats.

INTRODUCTION

Hyperlipidemia is a group of conditions that leads to elevated levels of lipids in the bloodstream such as triglycerides (TG), cholesterol and low density lipoprotein (LDL) increases, or the level of high density lipoprotein (HDL) decreases in the blood **Negm,S. H.(2023)**. Hyperlipidemia is becoming a major health problem in the world recently, even in humans **(Karam *et al.,* 2019)**. Hypercholesterolemia causes cardiovascular disease and accounts for one-third of all mortalities globally. Synthetic hypercholesterolemic medicines have increasingly declined in popularity as a result of their associated adverse effects and the emergence of treatment resistance. So, the use of medicinal herbs has risen **(Jørgensen *et al.,* 2013 Negm, S. H. (2023)** [a]. The American Heart Association defines hypercholesterolemia as a total blood cholesterol content of 240 mg/dl or above. It is a significant health condition that affects people all over the world. About 13 % of people aged 20 and above in the United States had elevated total cholesterol **(Soslowsky and Fryhofer, 2016)**.

Dietary factors such as continuous ingestion of high amounts of saturated fats and cholesterol are believed to be directly related to hypercholesterolemia and susceptibility to atherosclerosis **(Asahina *et al.,* 2005)**. Furthermore, dietary trials have revealed that the concentration of serum cholesterol is affected by both the content and source of proteins **(Forsythe et al., 2015)**. Lipid structure, composition, and configuration, in addition to excessive fat and cholesterol consumption are also believed to affect the lipid profile in the plasma **(Zulet *et al.*, 1999)**. Hypercholesterolemic animals are useful models for studies on cholesterol homeostasis, and drug trials to better understand the relationship between disorders in cholesterol .

Loquat (*Eriobotrya japonica*), an evergreen fruit tree in the *Rosaceae* family, is planted in many countries. The leaves and flowers of the loquat tree are used in the treatment of many diseases such as cancer, colds, and diabetes **(Liu *et al.,* 2016)**. Studies indicate the loquat has many vital activities such as improvement of lung, renal, neuronal cells, and liver function. It has an opposite effect on anti-allergic, anti-thrombotic potential, antiaging, antinociceptive activities, obesity and hypolipidemic activity. The fruit contains a diverse range of bioactive compounds contributing to its health benefits.

Among the most notable active components are phenolic compounds, such as chlorogenic acid, which exhibit strong antioxidant properties that help reduce oxidative stress and cellular damage **(Huang *et al.,* 2019)**. Furthermore, it contains triterpenoids like ursolic acid, which have shown anti-inflammatory and anticancer effects in laboratory studies **(Liu *et al.,* 2020; Zhang *et al.,* 2021)**. The fruit itself is abundant in natural sugars, dietary fiber, and vitamins such as vitamin A and vitamin C, making it an excellent choice for boosting immunity **(Chen *et al.,* 2018)**. In addition, studies have revealed that loquat seeds contain antimicrobial compounds, highlighting their potential application in pharmaceutical industries **(Wang *et al.,* 2022)**.

Therefore, the aim of the study

This study aimed to evaluate the potential effect of loquat (*Eriobotrya japonica*) on hypercholesterolemic rats.

MATERIALS AND METHODS

MATERIALS:

1- Fruit: The fresh Loquat (*Eriobotrya Japonica*) fruit was purchased from the Agriculture Research Center, Giza ,Egypt.

2- Chemicals: Cholesterol, bile salt, casein, cellulose, vitamin and mineral constituents were purchased from El-Gomhoriya Pharmaceutical Company, Cairo, Egypt. Starch, soy oil, and sucrose will be obtained from the Egyptian local market.

3- Animals: Thirty-five adult male rats (Sprague Dawley strain), weighing about 180±10 g b.wt., were obtained from the Laboratory Animal Colony, Helwan, Egypt.

METHODS:

Preparation of loquat fruit (*Eriobotrya japonica*) powder:

The fruits were washed and then dried using solar drying techniques at the National Research Center. In this method, the product is exposed to direct sunlight, and moisture is removed by natural wind circulation. These solar dryers enhance the rate of moisture loss and protect the product from adverse weather conditions without the need for fans to force air circulation **(Bolin *et al.,* 1982)**.

Induction of hypercholesterolemic rats:

The hypercholesterolemic diet was prepared according to **(Reeves *et al.*, 1993)** with some modifications, containing casein (14%), cellulose (5%), vitamin mixture (1%), sucrose (10%), mineral mixture (3.5%), choline bitartrate (0.25%), soy oil (4%), l-cystine (0.18), cholesterol (1%), and bile salt (0.25%), 15% beef tallow and the remainder was starch to induce hypercholesterolemia in rats **(Pandya *et al.*, 2006)**.

Experimental Design :

Thirty-five adult male albino rats, Sprague Dawley strain, weighing (180 ± 10 gm,) were housed in well-aerated wire cages. The experimental part has been done in the Faculty of Home Economics, Helwan University. Rats were housed in wire cages at a room temperature of 25°C and kept under normal healthy conditions. After the adaptation period, the rats were divided into five groups, (7 rats each) as follows :

The first group: (negative control) was fed on a basal diet only .

The second main group (n=28) was fed on a hypercholesterolemic diet (basal diet, 1% cholesterol, 0.25 % bile salt and 15% beef tallow), and then was divided into three subgroups as follows:

- The second subgroup: was fed on a hypercholesterolemic diet only as a positive control group.

- The third subgroup: was fed on a hypercholesterolemic diet supplemented with 2.5% of dried loquat (*Eriobotrya japonica*) fruit.

- The fourth subgroup: was fed on a hypercholesterolemic diet supplemented with 5% of dried loquat *(Eriobotrya japonica*) fruit.

- The Fifth subgroup: was fed on a hypercholesterolemic diet supplemented with 7.5% of dried loquat *(Eriobotrya japonica*) fruit.

Biological Evaluation:

Feed intake was recorded daily, animals were weighed at the beginning and twice a week throughout the experimental period (8 weeks). Body weight gain and feed efficiency ratio were calculated at the end of the experiment according to **Chapman, (1959)** using the following equation:

$$\textbf{BWG}\ \% = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{Initial body weight}} \times 100$$

FER = Weight gain (g) / Feed intake (g)

Blood Collection and Serum Separation:

At the end of the experimental period (8 weeks), rats were fasted overnight before being sacrificed, and blood samples were collected from each rat and centrifuged at 3000 rpm for 15 min to obtain the serum for biochemical analysis.

Biochemical analysis:

- Serum Lipid Profile:

Serum total cholesterol (TC) **(Richmond, 1973)**, triglycerides (TG) **(Wahlefeld, 1974)**, and high-density lipoprotein (HDL) **(Albers *et al*., 1983)** were determined. Meanwhile, low density lipoprotein (LDL) and very low density lipoprotein (VLDL) were calculated according to **Fridewald *et al*., (1972)**.

LDL-c = TC-[HDL-c + (TG/5)]   VLDL-c = TG/5

- Liver Function:

Serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were measured according to **Bergmeyer et al. (1978),** and alkaline phosphatase (ALP) was determined according to **Belfield and Goldberg (1971)**.

-Kidney Function:

Serum urea **(Kaplan, 1984)**, uric acid **(Patton and Crouch, 1977)** and creatinine were measured according to **(Murray, 1984)**.

Oxidant and Antioxidant Biomarkers:

The plasma level of malondialdehyde (MDA), which was calculated to measure lipid peroxidation was determined according to **Draper and Hadley (1990).** Superoxide dismutase (SOD) activity was evaluated by **Spitz and Oberley, (1989).**

Statistical analysis :

All data obtained results were analyzed using Statistical Package for the Social Sciences (SPSS) for Windows, version 20 (SPSS Inc., Chicago, IL, USA).Collected data were presented as mean± standard deviation (SD). Analysis of Variance (ANOVA) test was used for determining the significances among different groups according to **(Armitage and Berry, 1987).** All differences were considered significant if P-values were ($P< 0.05$).

RESULTS AND DISCUSSION

As shown in **Table (1)** there were no significant differences in initial body weight (IBW) among all groups. Regarding groups feeding on (HCD), the results show FBW, BWG% and FER of (+ve) hypercholesterolemic rats had significant ($p<0.05$) increases, but FI decreased as compared to the –ve group. It is well known that high-fat diets increase body weight and visceral fat deposition, and such findings have previously been published **(Negm, et al., 2023; Mostafa et al., 2025)**. This reflects the adverse impact of the hypercholesterolemic diet, which promoted abnormal body weight gain and impaired feed intake. On the other hand rats fed with diets supplemented with 2.5%, 5%, and 7.5% dried loquat powder showed a significant decrease in FBW, BWG%, and FER while FI increased compared with the positive control group. The most prominent effect was recorded at 7.5% supplementation where these values approached those of the negative control. These findings highlight the beneficial effect of loquat supplementation in controlling body weight and improving feed utilization under hypercholesterolemic conditions. Our results are in the same line with that obtained by **Mokhtari et al., (2024)** showed that the loquat juice-treated mice prevented weight gain and exhibited a significant loss in BW, as well as reduced liver and adipose mass. Similarly, **Elsherif et al., (2023)** observed that loquat significantly decreased the body weight gain and improved the feed efficiency ratio in hyperlipidemic rats. Furthermore, **Abdelrahman *et al.*, (2023)** demonstrated that ethanol extracts of loquat fruits significantly reduced body weight and improved feed efficiency in hyperlipidemic rats.

Table (1): Effect of loquat fruit on Initial Body Weight (IBW), Final Body Weight (FBW), Feed Intake (FI), Body Weight Gain (BWG%), and Feed Efficiency Ratio (FER) in hypercholesterolemia rats

Parameters / Groups	IBW (g)	FBW (g)	FI (g/d/rat)	BWG %	FER
Control (-Ve)	186.80 ± 1.77^{a}	235.60 ± 1.96^{d}	25	25.13 ± 0.41^{c}	0.035 ± 0.001^{d}
Control (+Ve)	187.40 ± 1.87^{a}	252.80 ± 1.11^{a}	20	34.90 ± 0.28^{a}	0.058 ± 0.001^{a}
2.5% of dried loquat	188.00 ± 1.70^{a}	245.20 ± 1.28^{b}	21	30.43 ± 0.78^{b}	0.048 ± 0.001^{b}
5% of dried loquat	187.40 ± 1.81^{a}	240.60 ± 1.50^{bc}	22.5	28.39 ± 0.57^{b}	0.042 ± 0.001^{c}
7.5% of dried loquat	187.41 ± 1.07^{a}	236.00 ± 1.89^{cd}	23	25.94 ± 0.37^{c}	0.037 ± 0.001^{d}

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at ($P < 0.05$).

As shown in **Table (2)** the positive control group (hypercholesterolemic rats) demonstrated a significant ($p<0.05$) increase in heart, lung, liver, kidney, and spleen weights compared with the negative control group. This enlargement of vital organs may be attributed to fat deposition oxidative stress, and inflammatory responses associated with hypercholesterolemia. In contrast dietary supplementation with 2.5%, 5%, and 7.5% of dried loquat significantly reduced the weights of these organs compared with the positive control. The most noticeable improvements were observed at 7.5% supplementation where organ weights approached the normal values recorded in the negative control group. These results indicate that loquat supplementation may protect against hypercholesterolemia-induced organ hypertrophy particularly in the liver and heart by reducing lipid accumulation and oxidative stress. This is in agreement with **Elsherif et al. (2023),** who observed that supplementation with 4 and 7% of loquat fruits significantly reduced the weights the liver, lung, heart, and spleen.

Table (2): Effect of loquat fruit on Heart, Lung, Liver, Kidney and Spleen weights in hypercholesterolemia rats

Parameters / Groups	Heart (g)	Lung (g)	Liver (g)	Kidney (g)	Spleen (g)
Control (-Ve)	0.54±0.06b	0.95±0.06b	4.92±0.37b	1.20±0.08ab	0.44±0.04b
Control (+Ve)	0.79±0.03a	1.53±0.06a	6.70±0.36a	1.43±0.08a	1.18±0.10a
2.5% of dried loquat	0.54±0.05b	1.32±0.11a	6.36±0.49ab	1.21±0.10ab	0.67±0.05b
5% of dried loquat	0.52±0.05b	0.89±0.03b	5.16±0.29ab	1.35±0.02ab	0.58±0.06b
7.5% of dried loquat	0.54±0.05b	0.82±0.08b	5.20±0.37ab	1.04±0.11b	0.58±0.01b

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at ($P < 0.05$).

As shown in **Table (3)** feeding rats with HCD caused an increase in TC, TG, LDL-C and VLDL-C levels and a decrease in HDL-C levels in treated mice compared to the positive control group. These results confirm the induction of hypercholesterolemia by the high-fat diet. These results agree with **Mostafa et al. (2025); Mokhtari et al. (2024); Negm,S.H.(2023); and Negm and El-Soadaa (2020),** who who observed that HFD fed on significantly increase ($P \le 0.05$) the level of lipid profile compared to the control negative group.

On the other hand rats fed diets supplemented with 2.5%, 5%, and 7.5% dried loquat powder exhibited a significant improvement in serum lipid profile compared with the positive control group. The most remarkable effects were observed in the 7.5% loquat groups, which showed a pronounced reduction in T.ch, TG, LDL-C, and VLDL-C, along with a significant elevation in HDL-C levels. These values approached those of the negative control, indicating a strong hypolipidemic effect. These findings are consistent with **Mokhtari et al., (2024a);** observed that loquat treatment reversed the observed disorders. Significant reductions in TC levels and atherogenic LDL-C fraction were observed suggesting that loquat juice can enhance the uptake of LDL-C by the liver and peripheral tissues through LDL receptors, as previously proposed **(Mokhtari et al., 2023)**. Similarly, **Abdelrahman et al., (2023)** who reported that loquat fruit extracts significantly improved lipid profiles in hyperlipidemic rats. Furthermore, the findings are consistent with those of **Khouya et al.,**

(2022) showed that loquat leaf aqueous extract reduced TC and TG in mice fed a high- cholesterol, high-glucose (HCG) diet for ten weeks.

Furthermore, the loquat fruit's effect on cholesterol metabolism was demonstrated by the increase in the anti-atherogenic HDL-C fraction. This particular fraction is involved in reverse cholesterol transport (RCT), a mechanism responsible for transporting cholesterol from peripheral tissues to the liver, eventually facilitating its excretion in the bile **(Mokhtari et al., 2024a).** Consequently, we suggest that the administered loquat can enhance the uptake and catabolism of TG-rich lipoproteins through lipoprotein lipase activation, as previously hypothesized **(Mokhtari et al., 2023a)**. The hypolipidemic activity of loquat may be attributed to its rich content of polyphenols, triterpenes, and flavonoids, which enhance lipid metabolism, inhibit cholesterol synthesis, and increase HDL-C levels.

Table (3): Effect of loquat fruit on Lipid Profile in hypercholesterolemia rats

Parameters / Groups	**T.ch** (mg/dL)	**T.G** (mg/dL)	**HDL** (mg/dL)	**LDL-c** (mg/dL)	**VLDL-c** (mg/dL)
Control (-Ve)	114.79±1.58d	66.93±0.79c	67.98±0.41a	33.43±0.48c	13.38±0.19c
Control (+Ve)	148.20±1.74a	94.02±1.44a	47.42±0.21d	81.06±0.99a	18.80±0.68a
2.5% of dried loquat	147.15±1.02a	79.96±1.28b	48.43±0.91d	82.73±0.62a	15.99±0.65b
5% of dried loquat	141.95±1.77b	71.12±0.68bc	57.84±0.19c	69.88±0.93b	14.22±0.13bc
7.5% of dried loquat	134.69±1.47c	69.16±0.36c	60.74±0.34b	67.29±0.94b	13.83±0.17c

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at ($P < 0.05$).

As illustrated in **Table (4),** feeding rats with HFD caused an increase in serum liver function markers, including ALT, AST, and ALP, compared with the negative control group. This elevation reflects hepatic injury and impaired liver function due to hypercholesterolemia and lipid accumulation. Furthermore, we discovered that the HCD-induced chronic hyperlipidemia changed the color, shape, and histology of the liver, suggesting the apparition of steatosis and lipotoxicity. This finding was supported by the increase in hepatic lipid content and higher plasma enzymatic indicators of liver injury in hyperlipidemic mice (ALT, AST, and ALP). However, loquat treatment significantly protected hyperlipidemic rats against liver damage, as evidenced by the integrity of the correction of plasma biochemical indicators. Conversely, rats supplemented with 2.5%, 5%, and 7.5% dried loquat demonstrated a significant improvement in serum ALT, AST, and ALP levels compared with the positive control. The most remarkable hepatoprotective effect was observed in the 7.5% loquat groups, where the enzyme levels approached those of the negative control. This finding affirms earlier observations regarding the hyperlipidemic protective effect of loquat juice treatment against liver damage **(Mokhtari et al., 2024a)** and seamlessly aligns with the findings of **(Abdelrahman et al., 2023)** reported similar findings, demonstrating that loquat extracts significantly lowered liver enzyme activities in hyperlipidemic rats. Also, **Elsherif et al., (2023); Shahat et al., (2018)** who successfully demonstrated the hepatoprotective effects associated with loquat. Specifically, the observed palliative effect of loquat fruits on chronic hyperlipidemia-induced liver tissue damage may be attributed to its hypolipidemic effect. In this manner, the loquat fruits allows the excretion of excess lipids in the bile and fecal matter, thereby preventing their harmful accumulation in liver tissues. The fat that builds up in the liver can be peroxided and subsequently produce several toxic molecules, including oxidized LDL, as well as lipid free radicals that can easily attack cell membranes, thereby causing tissue damage **(Ayala et al., 2014)**. These results suggest that dried loquat has a hepatoprotective role, possibly due to its rich content of polyphenols, triterpenes, and flavonoids, which can scavenge free radicals, suppress oxidative stress, and prevent hepatic lipid deposition.

Table (4): Effect of loquat fruit on Liver Function in hypercholesterolemia rats

Parameters / Groups	AST (µ /L)	ALT (µ /L)	ALP (mg/dL)
Control (-Ve)	65.14±1.31c	67.72±1.83e	117.30±1.58d
Control (+Ve)	100.24±2.35a	125.25±1.73a	214.58±3.31a
2.5% of dried loquat	94.90±1.63a	108.26±1.22b	142.96±2.14b
5% of dried loquat	78.78±1.13b	90.22±1.09c	127.74±1.88c
7.5% of dried loquat	67.54±1.15b	81.58±1.58d	118.68±2.02cd

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at ($P < 0.05$).

As shown in **Table (5),** feeding rats with HCD caused an increase in serum kidney function markers, including urea, creatinine, and uric acid, when compared with the negative control group. This means that the high-cholesterol diet caused stress and damage to kidney function. On the other hand, rats that received dried loquat at 2.5%, 5%, and 7.5% showed lower levels of urea, creatinine, and uric acid compared with the positive control group. The best effect was seen in the 7.5% groups, where the values became close to the negative control group. These findings are consistent with those of **Elsherif et al., (2023)**, who found that loquat fruits and leaves lowered serum creatinine and urea levels in hypercholesterolemic rats. Similar results were reported by **Abdelrahman *et al.*, (2023)**, who found that loquat extracts reduced kidney damage markers in hyperlipidemic rats. This action is attributed to the presence of loquat alkaloids, flavonoids, and glycosides (**Lu et al., 2019)**.

Table (5): Effect of loquat fruit on Kidney Function in hypercholesterolemia rats

Parameters / Groups	Urea (mg/dl)	Creatinine (mg/dl)	Uric Acid (gm/dl)
Control (-Ve)	33.40±1.20d	0.62±1.01d	5.48±0.25b
Control (+Ve)	53.70±1.35a	1.13±0.01a	7.78±0.19a
2.5% of dried loquat	46.20±1.09b	0.94±1.01b	7.04±0.17a
5% of dried loquat	40.46±1.59c	0.81±1.01c	6.02±0.18b
7.5% of dried loquat	34.90±1.75d	0.78±0.01c	5.78±0.31b

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at (P < 0.05).

As shown in **Table (6),** the positive control group (hypercholesterolemic rats) had a significant (p<0.05) increase in malondialdehyde (MDA) and a significant decrease in superoxide dismutase (SOD) activity compared with the negative control group. This shows that the high-cholesterol diet increased oxidative stress and reduced antioxidant defense. In response to these oxidative challenges, the body relies on crucial antioxidant mechanisms. These defense mechanisms play a vital role in neutralizing the harmful effects of oxidized molecules, underscoring the significance of maintaining a delicate balance between oxidative stress and antioxidant defenses for overall liver health **(Halliwell, 2024)**.

On the other hand, rats fed with 2.5%, 5%, and 7.5% dried loquat had lower MDA values and higher SOD levels compared with the positive control. The best improvement was observed in the 7.5% loquat groups, where the values were close to the negative control group. These results suggest that loquat supplementation can improve antioxidant status and reduce oxidative damage. These findings are consistent with **Abdelrahman et al. (2023)** reported that loquat extracts improved antioxidant enzyme activities and reduced lipid peroxidation in hyperlipidemic rats. Similarly, **Mokhtari et al., (2024a)** observed that the loquat juice reduces oxidative stress by lowering MDA and activating SOD. These findings highlight the potential of loquat not only in mitigating oxidative damage but also in promoting a balance between reactive oxygen species and protective antioxidant defenses within the liver. This finding is consistent with those of previous studies suggesting the beneficial effects of loquat fruit, seeds, leaves, and peels through antioxidant activity (**Elsherif et al., 2023, Mokhtari et al., 2023, Mokhtari et al., 2024a)**.

Moreover, the observed protective effect of loquat may be closely linked to the presence of bioactive minor compounds, notably phenolics, fibers, and carotenoids. These compounds, recognized for their diverse pharmacological activities, have been extensively investigated for their health-promoting properties **(Sagar et al., 2020)**. Loquat fruit is abundant in phenolics, particularly phenolic acids and flavonoids, which have been identified as potential contributors to hypolipidemic activity according to studies by **Kobayashi and Ikeda (2014) ; Mokhtari et al. (2023a).** Further, fibers could improve lipid homeostasis by inhibiting the intestinal absorption of cholesterol and facilitating its fecal excretion as demonstrated by **Bakr and Farag (2023)**. Conversely, these compounds, along with carotenoids and ascorbic acid, may play a crucial role in combating oxidative stress at the tissue level, as documented in previous studies **(González-Peña et al., 2021; Hamdan et al., 2022).**

Table (6): Effect of loquat fruit on Antioxidant markers in hypercholesterolemia rats

Parameters / Groups	MDA (ng/ml)	SOD (U/ml)
Control (-Ve)	1.13±0.16d	29.52±0.65a
Control (+Ve)	9.60±0.48a	9.40±0.53c
2.5% of dried loquat	6.22±10.39b	12.84±0.19bc
5% of dried loquat	4.42±0.11c	14.08±0.55b
7.5% of dried loquat	3.44±0.16c	14.58±0.39b

Data are expressed as mean ± SE.
Means with different superscript letters in the column are significantly differences at ($P < 0.05$).

Conclusion:

The loquat fruit demonstrates substantial health potential, exhibiting antihyperlipidemic, anti-hepatic liver, kidney and anti-oxidative stress properties. These promising findings suggest that the regular consumption of loquat fruits can prevent hyperlipidemia and mitigate liver and kidney complications. Furthermore, the loquat fruits composition positions it as a natural substrate, offering opportunities for the development of functional foods or dietary supplements with potential health benefits.

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التأثير المحتمل للبشملة (*Eriobotrya Japonica*) على الفئران المصابة بإرتفاع كوليسترول الدم

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الملخص العربي

هدفت هذه الدراسة إلى تقييم التأثير المحتمل للبشملة (*Eriobotrya japonica*) على الفئران المصابة بإرتفاع كوليسترول الدم. وتم تقسيم خمسة وثلاثين فأرًا ذكرًا بالغًا سلالة سبراجو داولى يزن حوالي (١٨٠ ± ١٠ جم) إلى مجموعتين، المجموعة الأولى، عدد الفئران (ن = ٧) تم تغذيتها على نظام غذائي أساسي وتم الاحتفاظ بها كمجموعة ضابطة سالبة، المجموعة الثانية: (فئران مصابة بإرتفاع كوليسترول الدم)، (ن = ٢٨)، تم تغذيتها على نظام غذائي عالي الدهون (HFD). بعد التحريض على ارتفاع الكوليسترول تم تقسيم الفئران على النحو التالي: المجموعة الفرعية ١ خصصت كمجموعة ضابطة موجبة والمجموعات الفرعية ٢ و٣ و٤ تم تغذيتها على نظام غذائي عالي الدهون مدعم بنسبة ٢,٥٪ ، ٥ ٪ ، ٧٪ من فاكهة البشملة المجففة، على التوالي. أظهرت النتائج أن الفئران المصابة بإرتفاع كوليسترول الدم والمعالجة بـ ٢,٥٪ ، ٥٪ ، ٧,٥٪ من فاكهة البشملة المجففة تسببت في تحسن كبير في وزن الجسم وانخفاض فى أوزان الأعضاء (القلب والرئة والكبد والكلى والطحال) مصحوبة بانخفاض كبير في مستويات صورة الدهون وكذلك في وظائف الكبد (ALT و AST و ALP) ووظائف الكلى (اليوريا والكرياتينين وحمض اليوريك) في حين تم تسجيل زيادة كبيرة في كوليسترول البروتين الدهني عالي الكثافة (HDL-c). بالإضافة إلى ذلك، انخفض بشكل كبير مستوى المالوندهايد (MDA) بينما زاد نشاط سوبر أكسيد ديسموتاز (SOD) بشكل كبير ($P < 0.05$). **الاستنتاج:** تُوفر فاكهة البشملة إمكانات صحية كبيرة، حيث تتمتع بخصائص مضادة لإرتفاع دهون الدم ومضادة للكبد والكلى ومضادة للإجهاد التأكسدي. كما تتيح فرصًا لتطوير أغذية وظيفية أو مكملات غذائية ذات فوائد صحية محتملة.