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Study Effect of Turnip Roots, Leaves and Their Mixture on Hypercholesterolemic Rats

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Abstract:
Hypercholesterolemia is one of the most severe health problems many people may face, causing complications such as atherosclerosis or blood clots. This study aimed to use turnip roots and leaves on hypercholesterolemia. Forty-eight male albino rats weighting 150 ±10 g were used in this study and divided into eight groups; each group contained six rats, control negative and control positive were fed on basal diet., The third, fourth, fifth, sixth, seventh, and eighth groups fed standard diets containing 2.5, 5, 2.5, 5, and 2.5, 5 % (turnip roots, turnip leaves, and mixture of turnip roots and leaves) powder, respectively. Rats were treated with 1.5% cholesterol, and 0.2% bile salts to induce hypercholesterolemia. The results showed improved liver enzymes (ALT), AST, and blood lipid profiles such as LDL-c, HDL-c, VIDL-c, and kidney function (urea, uric acid, and creatinine). The best results were recorded, especially the mixture of turnip roots and leaves powder (5%). In conclusion, hypercholesterolemic rats treated with (a 5%) mixture of turnip roots and leaves powder had improved lipid profile (HDL) and liver functions.

Key words: Turnip roots, Turnip leaves, Rats, Hypercholesterolemic and Biochemical analysis

Introduction:
Now there has been a decrease in the incidence of vascular diseases, which are closely related to atherosclerosis but coronary artery disease in addition to heart disease, cerebrovascular disease, and peripheral disease are still responsible for the majority of severe morbidity, in addition to the causes of death. between adults and the elderly **(1).**

Hypercholesterolemia is the main tool for increasing it the risks of atherosclerosis, genetic disorders and a diet high in saturated fat and cholesterol play a dangerous role The high level of the population of other developed countries of the world. Hypercholesterolemia Drugs that lower cholesterol level reduces the risk of heart disease by up to 30% to 40%

and when treating patients with a moderate dose of hypolipidemic drugs[2]**.** It is a form of hyperlipidemia and cholesterol is a sterol and a type of fat. It is one of the three main images of animal fats. Its functions are cells to build their membranes and therefore it is produced by all animal cells.

Cholesterol is a precursor to the formation of steroid hormones and bile acid, which is converted into vitamin D spread in the bloodstream. It is an essential molecule of the human body[3]**.** Elevated degree LDL cholesterol is taken into consideration to be hypercholesterolemia[4]**.** Since LDL cholesterol is Insoluble in water, is transported inside the blood plasma within protein particles (lipoprotein) [5]**.** Lipoprotein are Labeled by using their density very low-density lipoprotein (VLDL), Intermediate density lipoprotein (IDL), Low Density lipoprotein (LDL), High density lipoprotein. All the lipoprotein carry cholesterol but accelerated stage of Lipoprotein apart from HDL (termed non HDL LDL cholesterol), especially LDL cholesterol are associated with an Elevated risk of atherosclerosis and coronary heart sickness. In comparison higher stages of HDL cholesterol are Defensive. Elevated stage on HDL cholesterol and LDL inside the blood may be outcome of food regimen, obesity[4]**.**Inherited (genetic) disease or the presence of different disease one of these diabetes underneath energetic thyroid [6]**.** Reducing dietary for encouraged to reduce total blood LDL cholesterol and HDL in adults. in people with very high LDL cholesterol weight loss program is regularly Inadequate to achieve the desired reducing of HDL and lipid lowering medications or absorption are typically required. If essential different treatment, which includes LDL Apheresis or maybe surgery is done. Hypertriglyceridemia, if excessive (>1000mg/dl) calls for Remedy to prevent pancreatitis. Moderately improved Triglycerides degree (150 to 400mg/dl) are also difficulty Because they often arise as a part of a syndrome Distinguished with the aid of insulin resistance, obesity, hypertension and appreciably extended risk. The atherogenic dyslipidemia in sufferers with this insulin resistance or Metabolic syndrome is characterized by way of reasonably Improved triglycerides, low HDL-C levels and lipid depleted LDL Metabolic syndrome is not unusual in CHD Sufferers, as a result identification of moderate hypertriglyceridemia in affected person, even though the entire LDL cholesterol stage is normal have to trigger an assessment to become aware of disorder. Hyperlipidemia and decrease HDLC level occur as a consequence of numerous elements that Effects the awareness of various plasma lipoproteins [1]. The study exhibits the superiority of Hypercholesterolemia, hypertriglyceridemia and Abnormally high LDL-C and occasional HDL-C stages which Are famous chance factors for cardiovascular sicknesses in All age groups accelerated prevalence of dyslipidemia[7]**.**

Causes Environmental factors: weight problems and dietary preference, genetic elements: because of the additive consequences of More than one gene Secondary purpose diabetes

mellitus and metabolic syndrome Kidney disorder (nephritic syndrome Cushing syndrome Anorexia nervosa- Sleep deprivation Antiretroviral pills, like protease inhibitors and Nucleoside opposite transcriptase inhibitors Physical activity Hypothyroidism[8].

Risk factors: Being obese or overweight, eating a food plan high in saturated fat and trans fatty acid, Family history of coronary heart disorder, Not getting sufficient exercising High blood strain Smoking and Diabetes[9]. It is cultivated for its scrumptious roots and leaves (veggies) which are reaped at some point of the vegetative duration; even as the Turnip tops[11].Fructiferous stems with the flower buds and surrounding leaves, are ate up earlier than starting and even as nevertheless green[1, 11]. Young turnip roots are commonly eating up raw in salads, yet the Turnip greens and tops are commonly served cooked or steamed. Turnip leaves are characterized by means of a sour flavor, [1]. Because of the hint quantity of phenolic compounds and trivial antioxidant potential, Turnip root is taken into consideration to be much less beneficial to human health in comparison to Turnip tops and leaves[11]. Although there had been a few published articles approximately Brassicaceae own family, thus far only one overview has summarized phytochemical compounds in Turnip roots, leaves and tops[11].

This work was conducted to study the effect of turnip roots, leaves and their mixture powder on biochemical analysis of hypercholesterolemic rats.

Material and Methods

Materials:

turnip roots and leaves were obtained from local market, Menoufia Governorate, Egypt.

The induction of experimental obesity

Hypercholesterolemia was inducing in normal healthy male albino rats by fed on 1.5% cholesterol 0.2% bile salts supplemented in the basal diet and used as a positive control[13].

Casein, cellulose, choline chloride, and DL- Methionine

Experiment materials were purchased (Casein, cellulose, choline chloride powder, and DL- methionine powder) from Morgan, Cairo; Egypt.

Experimental animals

A total of 48 adult normal male albino rats Sprague Dawley strain weighing 150±10 g were obtained from Vaccine and Immunity Organization, Ministry of Health, Helwan Farm, Cairo, Egypt.

The chemical kits

Chemical kits were purchased (TC, TG, HDL-c, ALT, AST, urea, uric acid and creatinine) from Al-Gomhoria Company for Chemical, Medical and Instruments, Cairo, Egypt.

Methods

Preparations of turnip roots and leaves

To prepare turnip root and leaves were obtained from the local market in Menoufia Governorate. In March 2022. The roots and leaves of turnip are thoroughly washed under running tap water. Then the turnip root were cut in the form of thin slices, then the samples were collected and dried in an air oven at 60 degrees Celsius and grinded with a grinder until a powder was obtained The powder was placed in bags until[13].

Experimental design

There were forty-eight male Sprague Dawley albino rats, weighing (150 ± 10 g) in the experiment of this study. All groups of rats were fed the prepared standard diet [14]. for 7 consecutive days. After a week of adaptation, rats are divided into 8 groups, each group contains six rats as follows: group (I): rats fed on basal diet as negative control. Group (2): Hypercholesterolemic rats induced by fed on 1.5% cholesterol 0.2% bile salts supplemented in the basal diet and used as a positive control group. Group (3): A group Hypercholesterolemic rats fed on turnip roots as powder by 2.5% of the weight of basal diet Group (4): A group infected Hypercholesterolemic rats fed on turnip roots as powder by 5% of basal diet. Group (5): A group infected Hypercholesterolemic rats fed on turnip leaves as powder by 2.5 % of the weight of the rat. Group (6): A group infected hypercholesterolemic rats fed on turnip leaves as powder by 5 % of the weight of the rat. Group (7): A group infected Hypercholesterolemic rats fed on mixture of the turnip roots and turnip leaves as powder by 2.5 % of the weight of the rat. Group (8): A group infected hypercholesterolemic rats fed on mixture of the turnip roots and turnip leaves as powder by 5 % of the weight of the rat. During the experimental period, the body weight and feed intake were estimated weekly and the general behavior of rats was observed. The experiment period was taking 28 days, at the end of the experimental period each rat weight separately then, rats were anesthetized and then blood samples were taken.

Blood sampling:

After fasting for 12 hours, then blood samples obtained from hepatic portal vein at the end of each experiment. This is followed by the coagulation process at a temperature of thirty-seven degrees Celsius in a water bath for 30 minutes. It was left to clot in a water bath (37°C) for 30 minutes, The blood samples were centrifuged at 4000 rpm for ten minutes to separate the blood serum drawn into tubes and then kept in a deep freezer until use [15].

Body weight gain (BWG), feed intake (FI), and feed efficiency ratio (FER):

The duration of the experiment was 28 days, during which the weight of the mice was followed up every week and the net amount of feed was recorded according to were used for the calculation of feed efficiency ratios (FER) according to[16].as follow:

$$\text{FER \%} = \frac{\text{Body weight gain (g)}}{\text{Food intake (g)}} \times 100$$

Biochemical analysis:

Lipids profile:

Determination of total cholesterol:

Serum total cholesterol was determined according to the colorimetric method described by[17].

Determination of serum triglycerides:

The method used to determine triglycerides is the enzymatic method by counting according to the [18].

Determination of high density lipoprotein (HDL-c):

HDL-c was determined according to [19].

Calculation of very low density lipoprotein cholesterol (VLDL-c):

VLDL-c was calculated in mg/dl according to [20]. using the following formula:

VLDL-c (mg/dl) = Triglycerides / 5

Calculation of low density lipoprotein cholesterol (LDL-c):

LDL-c was calculated in mg/dl according to [20]. as follows:

LDL-c (mg/dl) = Total cholesterol – HDL-c – VLDL-c

Liver functions

Method used for alanine aminotransferase (ALT), serum aspartate aminotransferase (AST) were carried out according to the method of [21], **and** [22] , respectively.

Kidney functions

Determination of serum urea

Serum urea and serum creatinine were determined by enzymatic method according to [24], [25]

Statistical analysis:

The data were analyzed using a completely randomized factorial design [26] when a significant main effect was detected; the means were separated with the Student-Newman-Keuls Test. Differences between treatments of ($P \leq 0.05$) were considered significant using SPSS Program. Biological results were analyzed by One Way ANOVA.

Results and Discussion

Turnip fruits and leaves are known to be high in phytochemicals, such as phenolic compounds that contribute to their medicinal properties [27].The active phenolic components of rapeseed fruit and leaf powder prepared were characterized using high-performance liquid chromatography. The plant and leaves of turnip have been found to contain many phenolic compounds as shown in Table No. (1). The highest concentrations

of phenolic compounds were observed in oxalic acid, Fumaric acid, Ascorbic acid, hydroxycinnamic, and Flavonoids.

Table (1): phenolics, total flavonoids, DPPH and TEAC content of turnip leaves and roots extract

Concentration	(μmol/g)
Flavonoids	29.7
Hydroxycinnamic	28.44
Sinapic acid	22.80.75
phenolic acid	12.46
organic acid	31.51
Shikimic acid	36
Oxalic acid	1.
Fumaric acid	138.40
Ascorbic acid	168.35

Table (2): phenolic compounds turnip leaves by HPLC

Ferulic acid	326.17
Gallic acid.	0.75

Data presented in Table 3 show the effect of turnip root and leaves and their mixture on body weight gain (BWG), feed intake (FI) and feed efficiency ratio (FER) of hypercholesterolemic rats. The obtained results showed that the body weight gain (BWG) % of negative control recorded the lowest value when compared with positive control with significant difference. From hypercholesterolemic rats' groups, it is clear to notice that the lowest (BWG) % recorded for 5% mixture, while the highest BWG% recorded for 2.5 % turnip root with significant difference ($P \leq 0.05$). In case of feed intake, it could be notice that the feed intake (FI) % of negative control recorded the highest value when compared with positive control with significant difference. While 5% mixture recorded the lowest highest FI while the highest value recorded for 2.5 % turnip root with significant difference ($P \leq 0.05$). On the other hand, feed efficiency ratio (FER) of negative control recorded the highest value when compared with positive control with no significant difference ($P \leq 0.05$). In case of treated rat groups, it clear to mention that 5% mixture recorded the lowest FER while, the highest value recorded for 2.5 % turnip root with significant difference.

Data given in Table (4) show the effect turnip root and leaves and their mixture on liver functions (AST and ALT) of hypercholesterolemic rats. The obtained results indicated that the AST liver enzyme of positive control rats group recorded the highest value when compared with negative control group with significant difference ($P<0.05$). While the

highest AST liver enzyme of treated group recorded for group fed on 2.5 % turnip root but, the lowest value recorded for group fed on 5% mixture with significant difference (P<0.05). The mean values were. In case of ALT liver enzyme of positive control rats group recorded the highest value when compared with negative control group with significant difference (P<0.05). While the highest ALT liver enzyme of treated group recorded for group fed on 2.5 % turnip root but, the lowest value recorded for group fed on 5% mixture with significant difference (P<0.05). These results are in agreement with **(29).** who reported that In the group treated with serum, AST, and ALT, there was a significant improvement compared to the group of infected and untreated mice, and by increasing the percentage of leaves and roots, the mixture of leaves and roots was better in a dose-dependent manner, and 5% was the best, and the presentation was as follows **.**Effects of turnip roots and leaves on the liver and It is the liver enzymes that convert the amino acid into the fatty acid that is used in energy, AST and ALT**(30).**

Table (3): Effect of turnip roots and leaves and their mixture on body weight gain, feed intake and feed efficiency ratio of hypercholesterolemic rats:

Treatment/Parameter	BWG (g) Mean±SD	FI (g/day) Mean±SD	FER (%) Mean±SD
Control group (-)	$29.80^{a} \pm 0.76$	$20.66^{a} \pm 0.28$	0.014 ± 0.002^{a}
Control group (+)	$26.33^{b} \pm 1.10$	$20.16^{a} \pm 1.50$	0.013 ± 0.001^{b}
hypercholesterolemic rats with turnip roots powder (2.5%)	$23.83^{c} \pm 0.28$	$19.10^{ab} \pm 0.57$	0.012 ± 0.005^{c}
hypercholesterolemic rats with turnip roots powder (5%)	$22.83^{c} \pm 0.57$	$18.20^{bc} \pm 0.34$	0.012 ± 0.001^{c}
hypercholesterolemic rats with turnip leaves powder (2.5%)	$21.33^{d} \pm 1.0$	$17.0^{c} \pm 0.05$	0.012 ± 0.005^{b}
hypercholesterolemic rats with turnip leaves powder (5%)	$18.50^{e} \pm 0.86$	$16.63^{cd} \pm 0.05$	0.011 ± 0.001^{c}
hypercholesterolemic rats with mixture of turnip roots and leaves powder (2.5%)	$17.83^{e} \pm 0.76$	$15.10^{de} \pm 0.17$	0.011 ± 0.005^{b}
hypercholesterolemic rats with mixture of turnip roots and leaves powder (5%)	$16.76^{e} \pm 0.80$	$14.76^{e} \pm 0.25$	0.011 ± 0.006^{b}

BWG: body weight gain. FI = feed intake and feed efficiency ratio. FER = feed efficiency ratio
Each value is represented as Values are expressed as means ± SD; means in the same raw with different letter are significantly different (P < 0.05).

The effect of turnip root and leaves and their mixture on the serum total cholesterol and triglycerides of hypercholesterolemic rats are shown in Table (5). The obtained results indicated that the cholesterol levels of positive control group recorded the highest value when compared with negative control group with significant difference ($p < 0.05$). While the lowest cholesterol levels recorded for group fed on 5% mixture while the highest

value recorded for 2.5 % turnip roots with significant difference (P< 0.05). In the other hand, the triglyceride of positive control group recorded the highest value. While the lowest triglyceride recorded for group fed on 5% mixture while the highest value recorded for 2.5 % turnip roots with significant difference (P<0.05). These results are in agreement with **(34).**

Table (4): Effect of turnip roots and leaves and their mixture on liver functions level of hypercholesterolemic rats:

Treatment/Parameter	AST (U/L)	ALT (U/L)
Control group (-)	61.00^{f} ±0.1	44.66^{g}±1.50
Control group (+)	154.00^{a}±0.1	$88,05^{a}$ ±1.50
hypercholesterolemic rats with turnip roots powder (2.5%)	92.16^{b} ±2.40	83.00^{b} ±1.00
hypercholesterolemic rats with turnip roots powder (5%)	87.66^{c} ±1.50	82.00^{b} ±1.00
hypercholesterolemic rats with turnip leaves powder (2.5%)	78.51^{d}±1.00	77.10^{c} ±0.76
hypercholesterolemic rats with turnip leaves powder (5%)	78.33^{d} ±1.150	74.33^{d} ±0.57
hypercholesterolemic rats with mixture of turnip roots and leaves powder (2.5%)	78.66^{d} ±1. 5	66.00^{e} ±1.00
hypercholesterolemic rats with mixture of turnip roots and leaves powder (5%)	73.2^{e} ±.57	51.00^{f} ±1.00

AST: Aspartate aminotransferase, ALT: Alanine aminotransferase.
Each value is represented as Values are expressed as means ± SD; means in the same raw with different letter are significantly different (P < 0.05).

The effect of turnip root and leaves their mixture on serum lipid profile (HDL-c, LDL-c and VLDL-c) level of hypercholesterolemic rats was shown in Table (6). The results indicated that the HDL-c of negative control rats group recorded the highest value when compared with positive control group with significant difference (P<0.05). The mean values were While, the highest HDL-c of treated group recorded for group fed on 5% mixture but, the lowest value recorded for group fed on 2.5 % turnip root with significant difference (P<0.05). On the other hand, the LDL- c of positive control rats group recorded the highest value when compared with negative control group with significant difference (P<0.05). While the highest LDL-c of treated group recorded for group fed on 2.5 % turnip root, the lowest value recorded for group fed on 5 % mixture with significant difference (P<0.05). In case of VLDL-c, the positive control rats group recorded the highest value when compared with negative control group with significant difference (P≤0.05). While the highest VLDL-c of treated group recorded for group fed on 2.5 % turnip root, the lowest value recorded for group fed on 5 % mixture with significant difference (P<0.05).

Table (5): Effect of turnip roots and leaves and their mixture on serum total cholesterol and triglycerides of hypercholesterolemic rats:

Treatment/Parameter	Total cholesterol (mg /dl)	Triglycerides (mg /dl)
Control group (-)	90.50^{e} ±0.5	55.66±1.5^{h}
Control group (+)	128.33^{a} ±3.2	156.8^{a} ±1.00
hypercholesterolemic rats with turnip roots powder (2.5%)	109.00^{b} ±1.7	100.80^{b} ±0.76
hypercholesterolemic rats with turnip roots powder (5%)	98.66^{c} ±0.53	95.66^{c} ±0.57
hypercholesterolemic rats with turnip leaves powder (2.5%)	98.33^{c} ±0.57	87.83^{d} ±1.15
hypercholesterolemic rats with turnip leaves powder (5%)5	97.16^{c} ±0. 28	77.33^{e} ±1.25
hypercholesterolemic rats with mixture of turnip roots and leaves powder (2.5%)	96.16^{c} ±0.28	68.00^{f} ±1.00
hypercholesterolemic rats with mixture of turnip roots and leaves powder (5%)	94.66^{d} ±0.57	61.00^{g} ±0.57

Each value is represented as Values are expressed as means ± SD; means in the same raw with different letter are significantly different (P < 0.05).

These results are in agreement with **(37).** reported that many studies have shown its positive effects of turnip leaves when used as a supplemental feeding. These effects are manifested as improvement in lipid profile (HDL-c, LDL-c and VLDL-c), **(38).** also mentioned several studies that showed the positive effects of turnip leaves when used as a complementary food, which showed that turnip leads to lowering cholesterol due to the antioxidants present in turnip extract, which were recorded in treated mice that were obese using cholesterol and triglycerides, which caused an increase in abdominal fat and in some Birds that improve antioxidants, which prevents LDLs from oxidation to lipid hydroperoxides. Research conducted on humans has shown that turnip and leaf fruits have the ability to reduce blood fats and triglycerides, as well as LDL with VLDL, but in some studies on birds, this led to an increase in belly fat deposition. **(37).**

Data presented in Table (7) show the effect of turnip root and leaves and their mixture on the kidney functions (uric acid, urea and creatinine) level of hypercholesterolemic rats. The obtained results indicated that the creatinine level of positive control rats group recorded the highest value when compared with negative control group with significant difference (P<0.05). While the highest creatinine level of treated group recorded for group fed on 2.5 % turnip roots, the lowest value recorded for group fed on 5% mixture with significant difference (P<0.05). On the other hand, the urea level of positive control rats group recorded the highest value when compared with negative co77ntrol group with significant difference (P<0.05). While the highest urea level of treated group recorded for group fed on 2.5 % turnip roots but, the lowest value recorded for group fed on 5%

mixture with significant difference (P<0.05). In case of uric acid, the level of positive control rats group recorded the highest value when compared with negative control group with significant difference (P<0.05). While the highest uric acid level of treated group recorded for group fed on 2.5 % turnip root , the lowest value recorded for group fed on 5% mixture with significant difference (P<0.05).reported that the extract of turnip roots and leaves was used, like many popular extracts, and it was studied on kidney disease and diabetes caused by alloxan, and its use in different proportions improved the value of creatine, urea and uric acid in hypertensive rats.

Table (6): Effect of turnip roots and leaves and their mixture on lipid profile of hypercholesterolemic rats :

Treatment/Parameter	(HDL_{-C}) (mg/dl)	(LDL_{-C}) (mg/dl)	($VLDL_{-C}$) (mg/dl)
Control group (-)	44.83 ± 0.76^{a}	43.53 ± 0.57^{g}	11.132 ± 0.15^{g}
Control group (+)	27.00 ± 1.00^{f}	69.56 ± 1.10^{a}	31.76 ± 1.70^{a}
hypercholesterolemic rats with turnip roots powder (2.5%)	31.16 ± 1.00^{e}	57.56 ± 1.11^{b}	20.16 ± 1.2^{b}
hypercholesterolemic rats with turnip roots powder (5%)	34.16 ± 0.28^{d}	45.37 ± 1.15^{c}	19.13 ± 0.76^{c}
hypercholesterolemic rats with turnip leaves powder (2.5%)	36.66 ± 0.57^{c}	44.11 ± 1.13^{d}	17.56 ± 2.17^{d}
hypercholesterolemic rats with turnip leaves powder (5%)	40.50 ± 0.50^{b}	41.2 ± 1.15^{e}	15.46 ± 0.64^{e}
hypercholesterolemic rats with mixture of turnip roots and leaves powder (2.5%)	41.66 ± 0.57^{a}	40.9 ± 1.12^{f}	$13.\ 6\pm0.28^{e}$
hypercholesterolemic rats with mixture of turnip roots and leaves powder (5%)	43.16 ± 0.28^{a}	39.3 ± 1.12^{f}	12.20 ± 0.10^{f}

HDL: High density lipoprotein cholesterol. LDL =Low density lipoprotein cholesterol VLDL = Very low density lipoprotein cholesterol Each value is represented as Values are expressed as means ± SD; means in the same raw with different letter are significantly different (P < 0.05).

These results are in agreement with[(38).] reported that extract of turnip roots and leaves supplemented diet significantly lowered the plasma level of kidney functional markers including creatine, urea and uric acid**.**

Table (7): Effect of turnip roots and leaves and their mixture on creatinine, urea and uric acid of hypercholesterolemic rats:

Treatment/Parameter	Creatinine (mg/dl)	Urea (mg/dl)	Uric acid (mg/dl)
Control group (-)	.77±0.12^{d}	25.33±0.57^{J}	1.61±0.01^{d}
Control group (□)	2.33±0.15^{a}	56.33±0.21^{a}	3.81±0.02^{a}
hypercholesterolemic rats with turnip roots powder (2.5%)	1.80±0.10^{b}	48.00±1.0^{b}	3.63±0.05^{ab}
hypercholesterolemic rats with turnip roots powder (5%)	1.50±0.01^{b}	44.66±0.57$^{b c}$	3.46±0.15^{bc}
hypercholesterolemic rats with turnip leaves powder (2.5%)	1.30±0.20^{c}	42.16±1.20$^{c d}$	3.23±0.05^{c}
hypercholesterolemic rats with turnip leaves powder (5%)	1.10±1.12^{c}	37.50±1.5^{de}	2.50±.01^{d}
hypercholesterolemic rats with mixture of turnip roots and leaves powder (2.5%)	1.10±0.10^{c}	35.66±1.15^{ef}	2.44±0.05^{d}
hypercholesterolemic rats with mixture of turnip roots and leaves powder (5%)	0.80±0.05^{d}	31.66±0.57^{f}	1.87±0.27^{d}
LSD (P≤0.05)	0.453	1.620	0.912

Each value is represented as Values are expressed as means ± SD; means in the same raw with different letter are significantly different (P < 0.05).

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دراسة تأثير جذور وأوراق اللفت وخليطهما علي فرط الكوليسترول في فئران التجارب

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الملخص العربى

يعتبر ارتفاع الكولسترول بالدم من أخطر المشاكل الصحية التي قد يواجهها الكثير من الناس، والتي تسبب مضاعفات مثل تصلب الشرايين، أو جلطات الدم، لذلك هدفت هذه الدراسة إلى استخدام جذور اللفت وأوراقه في علاج فرط كوليسترول الدم. تم استخدام 48 من ذكور الجرذان البيضاء وزنها 150 ± 10 جم في هذه الدراسة وتم تقسيمها إلى 8 مجموعات، كل مجموعة تحتوي على ست فئران، مجموعة ضابطة سلبية وضابطة موجبة تم تغذيتها على النظام الغذائي الأساسي، المجموعة الثالثة، الرابعة، الخامسة، السادسة، السابعة والثامنة تم تغذيتهم على الوجبة الأساسية والتي احتوت على 2.5 و 5 و 2.5 و 5 و 2.5 و 5٪ علي التوالي من (جذور اللفت - أوراق اللفت - ومزيج من جذور اللفت والأوراق) على التوالي. اظهرت النتائج تحسنًا في إنزيمات الكبد ALT وAST ونسبة البروتينات الشحمية المنخفضة والمنخفضة جدا والعالية في الكثافة في الدم ووظائف الكلى (اليوريا وحمض البوليك والكرياتينين). وكانت أفضل النتائج لخليط مسحوق جذور اللفت والأوراق (5٪) . الخلاصة انه وجد أن الفئران المصابة بفرط الكوليسترول والمعالجة بمزيج (5٪) من مسحوق جذور واوراق اللفت حدث بها تحسن في مستوى الدهون الشحمية العالية الكثافة ووظائف الكبد.

الكلمات المفتاحية : جذور اللفت ، وأوراق اللفت ، الفئران ، ارتفاع الكولسترول ،تحاليل الكيمياء الحيوية.