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Influence of Burdock and Horsetail in Treatment of Renal Functions Disorder in Gentamicin-Induced Rats

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ABSTRACT:

This study examined the effect of various levels of (*Equisetum arvense, L.*) and burdock (*Arctium lappa, L.*) powdered and their mixtures on kidney-damaging rats. Forty-eight male albino rats weighing 160±10g have been used in the current research. There had been eight groups of rats. There are six rats in every group. Normal healthful male albino rats had been given injections of gentamicin at a level of 10 mg/kg b.w. as soon as a day for ten days to induce renal damage, whilst one group was once saved as the control negative. Renal functioning indications (creatinine, urea, and uric acid), glucose level, serum liver enzymes [Alanine aminotransferase (ALT), Aspartate aminotransferase (AST), and Alkaline phosphatase (ALP)], also lipid fraction such as triglyceride (TG), total cholesterol (TC), Low-Density Lipoprotein (LDL-c), Very Low-Density Lipoprotein (VLDL-c), and High-Density Lipoprotein (HDL-c), have also been measured and based on the findings, the kidney and liver biomarkers, glucose range, and lipid profiles of tested rats improved when burdock and horsetail powder were combined. The 4% mixed produced excellent effects and is encouraged as a beverage to enhance renal function. In conclusion, horsetail and burdock should be considered adequate therapeutic spices or food additive regimens for treating renal disorders in rats.

Keywords: *Rats, Burdock, Horsetail, Kidney Disorder, Biochemical Assay*

1. INTRODUCTION

Filtration, metabolic processes, and outflow of chemicals are all crucial functions of the kidney, making it a vital organ in our bodies. The maintenance of appropriate arterial pressure control and base-acid balancing is largely dependent on the renal system (1). A critical element in keeping the equilibrium of acid base is the renal system. Approximately one fourth of the blood drifting from the coronary heart is filtered via the kidneys. Its takeaway metabolic by-products from metabolism and adsorption, are imperative for the removing of urine (2). Additionally, the renal system produces a variety of hormones that are fundamental to the body's operations, such as these

that follow: In addition, calcitriol is a vitamin D motion type that aids in the development of strong bones by regulating how effectively elements from meals like calcium and phosphorus are absorbed. (3).

Equsetum arvense, additionally recognized as horsetail, is an herb that grows in unsettled or fertile soil. The herb that resembles a horse's tail when gathered is recognized by using its famous name, "common horsetail" (4). Since long ago, developing horsetail used to has utilized for its numerous health advantages. This herb has been utilized for treating a range of conditions, which includes kidney and bladder ailments such as tuber anemia, peptic and different kinds of ulcers, fistulas and colon polyps, inflammation, and hemorrhaging (5). Horsetail has a vast variety of chemical and organic properties, which include phytochemicals, alkaloids, polyphenols, vapor oils, micro-elements, vitamin C, some acids, and many more (6). The ethanol extract from horsetail reduces the excretion of adenosine triphosphate (ATP), which in turn influences urinary bladder motion (7). Furthermore, it used to be additionally proven that the flavonoids and phenolic chemical compounds that had been extracted from horsetail had liver-protective properties. Additionally, long-term renal failure animal kind established the kidney-protective and pressure-reducing results of its extracts (8).

Originally from Asia and Europe, Arctium lappa, L., additionally referred to as burdock, is an extensively distributed, environment- and continent-adapted therapeutic herb belonging to the family of Asteraceae (9). Either tea, a decoction or natural treatment, burdock is taken. Extracts ready from each element of the burdock herb displays a range of organic and pharmaceutical processes, such as antioxidant, anti-inflammatory, hypoglycemic, antibacterial, anti-allergic, antiulcer, gastroprotective, liver-protective, anti-cytotoxic influence and antiacne (10). Burdock extract can be used therapeutically for treating renal disturbances; in these cases, aggregate remedy of the extract proven to be higher than extract following therapy. Conversely, co- and post-treatment with burdock extract brings electrolytes in the blood, renal activity, renal extent and weight, and urine electrolytes output nearer to regular values (11). One of the essential energetic factors in burdock therapy is arctigenin (ATG), which causes acute renal harm brought about by means of immunological response thru triggering tube cell dying whilst decreasing cytokines that promote irritation and infiltration of inflammatory cells (12).

The main goal of this research was once to investigate the influences of horsetail, burdock, and their powdered mix at different doses (2 and

4%), on certain biochemical analysis of rats with renal damage.

2. Materials and methods

2.1 Materials

2.1.1. The herbal used

Horsetail and burdock were purchased from Haraz for Natural Products, Bab El-Khalq, Cairo, Egypt.

2.1.2. Gentamycin

The antibiotic gentamicin is derived from aminoglycosides and is purchased from Pharma. Chemical. Industry. in Cairo.

2.1.3. Experimental animals

For this research, 48 grownup male rats, averaging 160g, have been given by means of the Immunity & Vaccine Organization, Ministry of Health in Helwan Station of Cairo.

2.1.4. Chemical kits

The kits for glucose, lipid fraction, liver and renal biomarkers used for investigation which collected at El-Nasr Pharmaceutical Chem, El-Ameria, Cairo.

2.2. Methods

2.2.1. Preparations of herbs

All the dry ingredients were thoroughly ground with a powered smashed and saved in glass containers with cork seals in dry place till needed.

2.2.2. Kidney damage Induction

By injecting gentamycin intraperitoneally at a level of 100 mg/kg/day in one-week, normal, healthy male albino rats were made to induce nephrotoxicity in accordance with Morales, et. al., (13).

2.2.3. Experimental design

Research No. #10-SREC-06-2021 was approved by the Menoufia University Ethics Committee for Research in Home Economics Faculty.

In the present study, forty-eight grownups male rats, averaging 150-160g, had been utilized. For a length of 7 days, as an ability of adaptations, all rats had been fed a casein diet formulated in accordance with Reeves et al., (14). After this adaptation time, the rats have been divided into eight groups of six individuals:

Group (1): Rats were provided a basal diet only and applied as negative control.

Group (2): Renal-damaging rats had been only given a standard diet and applied as a positive control group.

Group (3): Renal-damaging rats were given a standard diet and horsetail powdered at a ratio of 2.0%.

Group (4): Renal-damaging rats were given a standard diet and horsetail powder at a ratio of 4.0%.

Group (5): Renal-damaging rats were given a standard diet and burdock powder by 2.0%.

Group (6): Renal-damaging rats were given a standard diet and burdock powder at a ratio of 4.0%.

Group (7): Renal-damaging rats were given a standard diet and mix of horsetail and burdock powdered at a ratio of 2.0%.

Group (8): Renal-damaging rats were given a standard diet and mix of horsetail and burdock powdered at a ratio of 4.0%.

Every animal was once individually weighed, slaughter, and blood have been taken at the finish of the 28-day trial.

2.2.4. Blood sampling collections

At the finish of the trial, the rats were fasted for twelve hrs. then sacrifice. Blood had been extracted from the portal vein and put in sterile, dry centrifuge tubes separate the serum. Centrifuging the blood samples, separated the serum for ten min. at 3500 rpm Schermer, (15). Samples of serum were placed in freezers at -18 °C until they were analyzed chemically.

2.2.5 Biochemical analysis

Enzymatic procedures Patton and Crouch (16) and Henry, (17) were applied to estimate serum urea and creatinine in accordance with the methodology. While the method of Barham and Trinder (18) was used with a colorimeter, uric acid is measured. Kits from spin react, glucose has been tested with adjustments technique (19).

Serum alkaline phosphatase (ALP), serum aspartate amino transferase (AST), and serum alanine amino transferase (ALT) were measured using procedures provided by Hafkenscheid, (20), Henary, (21), and Moss, (22), respectively.

Using kits and an enzymatic process, the colorimetric technique outlined by Thomas, (23) was used to identify serum total cholesterol. In accordance with (24) and (25), serum triglycerides were assessed. HDL-c is found using the procedure outlined in (26) and (27). In accordance with Lee and Nieman, (28) the VLDL-c was computed in milligrams per deciliter applying the formula that follows: VLDL-c = TG / 5. According to (28) the LDL-c was estimated in mg/dl as follows:

LDL-C = TC– (HDL-c + VLDL-c).

2.2.6. Statistical analysis

Data were analyzed using a full randomness in the factorial structure (29) The Student-Newman-Keuls Test was once used to separate the means when a considerable important effect was once found. Differences between remedies at ($P \leq 0.05$) had been deemed big in accordance with the Costat Programmed. The biological consequences had been evaluated the usage of One Way ANOVA.

3. Results and Discussion

Table (1) indicates the influence of a variety of quantities of burdock, horsetail, and their blended powdered on serum renal functions like urea, creatinine, and uric acid in kidney-damaging rats. The control positive group had considerably larger serum uric acid ranges in contrast to the negative control groups had been 12.50 and 5.60 mg/dl, correspondingly. Among each of treated groups, the rats in the kidney-damaging groups who fed on 2% horsetail powder had the highest serum uric acid amount. The lowest values for kidney-damaging rats given a 4% mixture powder had been 8.30 and 6.30 mg/dl, correspondingly, with considerable variation.

The findings confirmed that the serum urea value of control positive group was

once considerably bigger value than that of control negative group. The respective average had been 19.30 and 35.90 mg/dl. Conversely, kidney-damaging rats given 4% horsetail powdered had bigger value serum urea quantity of any tended group; kidney-damaging rats given 4% mix powder had a had a much lower value, with a significant variation. The averages ranged 20.55 and 27.05 mg/dl, in that order.

On the contrary hand, each of the negative and the positive control groups' serum creatinine levels, which have been 1.55 and 0.68 mg/dl, correspondingly, varied considerably. As though kidney-damaging rats given a 4% powdered combine confirmed the lowest ranges, the rats in the kidney-damaging group that obtained 2% horsetail powder possessed the biggest degrees of serum creatinine. The common ranges differed considerably between 1.26 and 0.88 mg/dl, correspondingly. These outcomes concur reflect previous study by (30), who concluded that there existed a considerable drop in creatinine, urea, and uric acid levels by using horsetail ethanolic extract, because it contains numerous active compounds like alkaloids, flavonoids, phenol, phenolic sterols, triterpenoids, phytosterols, tannin, saponins, volatile oils.

Burdock reduced the injury prompted with the aid of oxidation and cell death brought on via immoderate hyperglycemia whilst increasing the survival of cells. It indicates that, considering the situation, burdock may additionally be a beneficial remedy desire for diabetic nephropathy in healthcare facilities (31).

Renal sickness additionally raised serum ranges of uric acid, creatinine, and urea. In the meantime, renal functions decreased when fed a primary diet supplemented with natural herbals. However, the influence of renopathy was once countered by using natural collections, which resulted in a minimization in renal functions like urea, creatinine, and uric acid (32).

Table (1): Influence of varying levels of burdock, horsetail, and their mix powder on renal biomarkers of kidney-damaging rats

Parameters Groups	Uric acid (mg/dl)	Urea (mg/dl)	Creatinine (mg/dl)
G1 C (-)	5.6d±0.84	19.3e±1.12	0.7b±0.13
G2 C (+)	12.5a±1.12	35.9a±1.10	1.6a±1.10
G3 (2% Burdock)	7.8b±0.60	26.3b±1.13	1.3a±0.12
G4 (4% Burdock)	6.9c±1.02	21.3d±1.16	1.0b±0.14
G5 (2% Horsetail)	8.3b±1.15	27.0b±1.12	1.4a±0.35
G6 (4% Horsetail)	7.2c±0.81	23.3c±1.15	1.1b±0.13
G 7 (2%Mixture herbs)	6.8c±0.52	24.2c±1.11	1.1b±0.11
G8 (4%Mixture herbs)	6.3c±0.56	20.5d±1.14	0.9b±0.15
LSD(P≤0.05)	1.006	1.525	0.438

Every value is proven as mean ± standard deviation; means varying letters in the equal column indicate considerable variations (P≤0.05).

Data provided in table (2) illustrates the impact of horsetail, burdock, along with

powdered combine on glucose ranges in kidney-damaging rats. There are notable versions between the average values for the groups serving as positive and negative controls, which are 189.25 and 101.50 mg/dl, correspondingly. The rats in the group with renal damage consumed a 4% combination powdered diet, which led to the lowest quantity of glucose amongst all the treated groups. The rats in the group with renal damage 2% horsetail powdered diet displayed the highest rate. The average findings, which have been 162.70 and 127.30 mg/dl, accordingly, have been considerably different. These consequences correspond with those of (33), who observed that burdock has large concentrations of the dietary fiber inulin, polyunsaturated fatty acids, complex carbohydrates, and phytochemicals, all of which have pharmaceutical and biological functions, include reducing blood sugar levels.

Furthermore, due to the fact of its active chemical constitutions, and fiber which influences cytokine release, horsetail extract holds a lot of possibilities to be utilized for the management of type two diabetes (34).

Better enhancements in serum glucose degrees have been viewed when the powdered natural herbs combination used to be used. The 4% combination yielded excellent effects and is encouraged as a beverage to enhance renal function (35).

Table (2): Influence of varying levels of burdock, horsetail, and their mix powder of glucose in kidney-damaging rats

Parameters Groups	Glucose mg/dl
G1 C (-)	101.50f ±3.30
G2 C (+)	189.25a ± 4.17
G3 (2% Burdock)	153.45c ±3.42
G4 (4% Burdock)	145.00d ±3.60
G5 (2% Horsetail)	162.70b±4.24
G6 (4% Horsetail)	156.25c ±3.31
G 7 (2%Mixture herbs)	144.45d ±2.64
G8 (4%Mixture herbs)	127.30e ±2.45
LSD(P≤0.05)	3.860

Every value is proven as mean ± standard deviation; means varying letters in the equal column indicate considerable variations (P≤0.05).

The impact of horsetail, burdock, and their powdered combination on ALT, AST, and ALP liver activities kidney-damaging rats is proven in Table (3). ALT enzyme ranges in control positive and negative groups had been genuinely different, ranging from 80.50 to 28.70 U/L, respectively. Rats given 4% combination powdered and regarded kidney-damaging had the least amount ranges of liver ALT. The kidney-damaging group of rats, whose suggest values have been 46.30 and 57.50 U/L, accordingly, had the highest level with substantial versions in contrast to the rats given 2% horsetail powdered.

The liver enzyme AST values for the negative and positive control groups had been 121.65 and 164.10 U/L, respectively, and the data indicated considerable versions between them. Among all the treated groups, kidney-

damaging rats receiving a 4% powder combine had the lowest AST enzyme level. The greatest value, 36.20 and 47.65 U/L, accordingly, with considerable variances, used to be recorded for kidney-damaging group rats received 2% horsetail powdered form, with a considerable distinction.

There had been notable variations in the ALP liver enzyme ranges amongst the positive and negative control groups. 312.00 and 195.20 U/L were the average values, correspondingly. The kidney-damaging group of rats given 4% combination powders had the lowest ALP enzyme of all treated groups. The kidney-damaging crew rats fed 2% horsetail powder possessed the greatest observed value, with considerable versions (P≤0.05). The averages had been 236.00 and 256.50 U/L, correspondingly. This result supports research by (36), who confirmed that burdock assists in detoxifying the liver through boosting its enzymes' capacity to metabolize ethanol and carbon tetrachloride. Burdock's anti-inflammatory and antioxidant characteristics may additionally be the reason for its useful consequences on blood purification and hepatic enzymes.

It has been demonstrated that the phenolic and flavonoids extracted from horsetail have a liver-protective impact, which implies that utilizing horsetail may be useful for enhancing the functioning of the liver (37).

Additionally, in contrast to positive control rats, giving kidney damaging rats the studied plant resulted in improvements in liver activities including GOT, and GPT (38).

Table (3): Influence of various levels of burdock, horsetail, and its mix powder on liver activities of nephrotoxic rats

Parameters Groups	ALT U/L	AST U/L	ALP U/L
G1 C (-)	28.7f±0.65	121.6f±2.18	195.2f±3.1
G2 C (+)	80.5a±1.7	164.1a±4.6	312.0a±4.4
G3 (2% Burdock)	54.2c±1.5	138.6d±2.4	248.3c±4.2
G4 (4% Burdock)	51.7d±1.4	131.2e±2.3	245.2c±40.3
G5 (2% Horsetail)	57.5b±1.6	147.6b±3.2	256.5b±4.5
G6 (4% Horsetail)	54.7c±1.2	143.7c±3.4	253.5b±3.4
G 7 (2%Mixture herbs)	52.0d±1.1	141.6c±3.2	240.7d±3.3
G8 (4%Mixture herbs)	46.3e±1.1	136.2d±03.1	236.0e±03.1
LSD(P≤0.05)	2.125	3.368	4.107

Every value is proven as mean ± standard deviation; means varying letters in the equal column indicate considerable variations (P≤0.05).

Data from table (4) demonstrated how varied concentrations of burdock, horsetail, and their powdered mixture affected the renal damage rats' serum TC and TG. The obtained outcomes, which had been 98.75 and 152.00 mg/dl, correspondingly, for the TC ranges in the positive and negative control groups, confirmed a considerable difference. In contrast, the renal damage group of rats fed with 4% combination powder had the least amount ranges TC among the

treated groups. While the maximum value reported with nephrotoxic group rats fed on 2% horsetail powder had a great variation, which were 135.00 and 116.50 mg/dl, correspondingly.

Data showed that there have been great variations in triglycerides between the positive and negative control groups. The average rates have been 89.50 mg/dl and 139.00. The lowest triglyceride ranges were found in the 4% combination powder-fed renal damage group of rats. While the nephrotoxic group rats given 2% horsetail powdered showed the greatest amount with a great variation. The greatest amount was obtained using a 4% mixture of horsetail and burdock. The average amounts are 125.25 and108.00 mg/dl, correspondingly. The outcomes are consistent by (39) who discovered that the horsetail contains polyphenols that affect apolipoproteins (apo) A and B, which reduce plasma triglyceride levels, the risk of heart disease. Polyphenols also help metabolize cholesterol and lipoprotein in the liver to reduce dietary cholesterol absorption, thus, the level of cholesterol in the plasma decreases.

Additionally, Ahangarpour et al., (40) reported that using of burdock roots lowered serum triglycerides and total cholesterol levels in male mice. The highest decrease recorded for burdock roots extract.

Table (5) illustrates how varying concentrations of burdock, horsetail, and their powdered mixture affected the lipid profiles of nephrotoxic rats for high density lipoprotein cholesterol (HDL-c), low density lipoprotein cholesterol (LDL-c), and very low-density lipoprotein cholesterol (VLDL-c).

Table (4): Influence of various levels of burdock, horsetail, and their mix powdered on total cholesterol and triglycerides of nephrotoxic rats

Parameters Groups	Total cholesterol mg/dl	Triglycerides mg/dl
G1 C (-)	98.75e±1.15	89.50f±1.14
G2 C (+)	152.00a±2.38	139.00a±1.90
G3 (2% Burdock)	125.25c±1.24	116.00c±1.26
G4 (4% Burdock)	119.75d±1.33	110.00e±1.11
G5 (2% Horsetail)	135.00b±1.47	125.25b±1.23
G6 (4% Horsetail)	126.00c±1.10	117.75c±1.08
G 7 (2%Mixture herbs)	118.00d±1.04	114.00d±1.03
G8 (4%Mixture herbs)	116. 50d±1.00	108.00e±1.01
LSD(P≤0.05)	3.160	3.018

Every value is proven as mean ± standard deviation; means varying letters in the equal column indicate considerable variations (P≤0.05).

It is apparent that levels of HDL-c are considerably different (P≤0.05) considered by the control groups, both negative and positive. There were 50.05 and 30.55 mg/dl on average, correspondingly. The greatest HDL-C levels were found in the rats from the nephrotoxic group that were fed a 4% powder mixture. However, the smallest amount was observed in nephrotoxic rats

given 2% horsetail powder, which were 42.45 and 34.55 mg/dl, correspondingly, with significant differences (P≤0.05).

The data show that the LDL-c levels for both the negative and positive control groups differ considerably, which were 30.80 and 93.65 mg/dl, correspondingly. The nephrotoxic group rats fed a 4% mixture powder had the lowest LDL-c of all the treated groups. While the greatest value obtained for nephrotoxic rats group given 2 % horsetail powder with a significant difference (P≤ 0.05), which were 52.45 and 74.40 mg/dl, correspondingly.

However, there were differ considerably (P≤0.05), considered by negative and positive control groups for VLDL-c, which were 17.90 and 27.80 mg/dl, correspondingly. The rats in the nephrotoxic group, who received a 4% mix powder, had the least amounts of VLDL-c amongst all remedy groups. Whereas the greatest value was noted in the nephrotoxic group of rats received a 2% horsetail powder with differ considerably (P≤ 0.05). The suggested values had been 15.60 and 25.05 mg/dl, correspondingly. These findings are consistent with Hou et al., (41) who reported that burdock root aqueous extract ought to attenuate the body weight of rats in a dose-based manner following administration of a high-fat diet. In addition, it ought to additionally help minimize cholesterol ranges in the identical rats.

Furthermore, lipid profiles after oral burdock root extract injection validated the extract's capability to decrease cholesterol. Thus, the have an impact on weight rise may want to be attributed to any manner different than the fats metabolic route. Furthermore, the existing research confirmed that burdock root extract dosages each protect healthy rats from dropping weight and reason weight increase in the untreated group (42).

Table (5): Influence of various levels of burdock, horsetail, also their mix powdered on lipid profile of nephrotoxic rats

Parameters Groups	HDL-c mg/dl	LDL-c mg/dl	VLDL-c mg/dl
G1 C (-)	50.0a±1.60	30.8f±1.10	17.9e±1.11
G2 C (+)	30.5d±2.18	93.6a±1.94	27.8a±1.65
G3 (2% Burdock)	36.3c±1.14	64.7c±1.46	23.2c±1.41
G4 (4% Burdock)	39.2bc±1.13	58.5d±1.12	22.0d±1.35
G5 (2% Horsetail)	34.5c±1.17	74.4b±1.50	25.0b±1.60
G6 (4% Horsetail)	36.1c±1.15	65.3c±1.33	17.5e±1.42
G 7 (2%Mixture	41.1b±1.14	54.0e±1.13	22.8c±1.23
G8 (4%Mixture	42.4b±1.15	52.5e±1.15	15.6f±1.20
LSD(P≤0.05)	2.413	2.375	1.015

Every value is proven as mean ± standard deviation; means varying letters in the same column indicate considerable variations (P≤0.05).

4. Conclusion

Burdock, horsetail, or their mixture significantly improved renal functions

level, enhanced HDL-c, and decreased levels of liver functions and glucose level. Uutilization of a mixture of burdock, horsetail, powder in our regular beverage drinks.

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التغذية وعلوم الاطعمة

تأثير الأرقطيون وزيل الحصان في علاج خلل وظائف الكلى في الفئران المستحث بالجنتاميسين

مها شحاتة، بسمة خطيب ، فتحية شبل

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الملخص العربي:

تناولت هذه الدراسة معرفة تأثير مستويات مختلفة ٢, ٤% من مسحوق نبات ذيل الحصان وأوراق الأرقطيون وخليطهم معا على الفئران المصابة بخلل في الكلي. تم استخدام ثمانية وأربعين فأرًا أبيضًا من الذكور البيضاء بوزن ١٤٠-١٥٠ ± ١٠ جرام في الدراسة الحالية. كان هناك ثماني مجموعات من الفئران، ستة فئران في كل مجموعة. تم إحداث خلل في الكلى في ذكور الفئران البيضاء السليمة عن طريق حقن ١٠ ملجم / كجم من وزن الجسم من الجنتاميسين مرة واحدة يوميًا لمدة ١٠ أيام عن طريق الوريد، بينما تم الاحتفاظ بإحداهما كمجموعة ضابطة سالبة. تم تقدير التحاليل التالية مؤشرات وظائف الكلى (الكرياتينين واليوريا وحمض البوليك)، ومستوى الجلوكوز، وإنزيمات الكبد في السيرم ألانين أمينوترانسفيراز، والأسبارتات أمينوترانسفيراز، الفوسفاتيز القلوي، وصورة دهون الدم (الدهون الثلاثية، والكوليسترول الكلي والبروتين الدهني منخفض الكثافة والبروتين الدهني منخفض الكثافة جدا والبروتين الدهنى عالى الكثافة). بناءً على النتائج، تم احداث تحسن فى المؤشرات الحيوية للكلى والكبد ومستوى الجلوكوز في الدم وصورة الدهون لدى الفئران بشكل كبير خاصا عندما تم استخدام مسحوق الأرقطيون وذيل الحصان. أظهر الخليط بتركيز ٤% تأثيرات مرتفعة ويتم التوصية به كمشروب لتعزيز وظائف الكلى. في الختام، ينبغي اعتبار ذيل الحصان والأرقطيون من أنظمة التوابل أو المواد المضافة العلاجية الفعالة لتحسين الخلل في الكلي.

الكلمات المفتاحية: الفئران، الأرقطيون وذيل الحصان، الفشل الكلوي، التحاليل الحيوية.