Effect of Red Grape Juice and Kiwi Juice on Reduction of Potato Chips Hazards in Experimental Rats.

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Abstract

Nowadays, it is common and easy to eat unhealthy food especially potato chips which poor nutritional value, low micronutrients and high content of fats and calories. This study carried out to investigate the effect of dietary supplementation with red grape juice and kiwi juice on reduction of potato chips hazards in experimental rats. It's known, the red grape Juice and kiwi juice are rich in polyphenols and antioxidant activity. Forty two adult male albino rats weighing (١٥٠±٥g.) were randomly distributed after adaptation period into ٦ main groups (٧ of each). The first main group (n=٧) was as a negative control group (-ve) and fed on basel diet. Group ٢ rats fed on basel diet supplemented with potato chips ٢٠٪ as a positive control group (+ve). Group ٣ and ٤ fed on basel diet supplemented with potato chips ٢٠٪ and administrated orally with ٥ and ١٠ ml grape juice for ٦ weeks, respectively. Group ٥ and ٦ fed on basel diet supplemented with potato chips ٢٠٪ and administrated orally with ٥ and ١٠ ml kiwi juice for ٦ weeks, respectively. At the end of the experimental period (٦ weeks) blood samples was taken for biochemical analyses. Feed intake and body weight gain were estimated and calculated. In addition, the activities of alanine transaminase (ALT), aspartate transaminase (AST), urea nitrogen, creatinine , lipid profile, antioxidants enzymes, MDA as well as hematological profile were analyzed. Histobathological examination liver and kidneys were done. The results showed that liver enzymes such as alanine transaminase (ALT), aspartate aminotransferase (AST), urea nitrogen and criatinine were decreased significantly in the groups ٣,٤,٥, and ٦, respectively compared with the positive control group. In addition MDA were decreased significantly in the groups ٣,٤,٥, and ٦, respectively compared with the positive control group. However, lipid profile such as total cholesterol, tri glyceride, LDL, VLDL was decreased significantly when compared with positive control group. However hematological profile in addition HDL and anti-oxidant enzymes (CAT and SOD) were significantly increased in groups ٣,٤,٥, and ٦, respectively compared with the positive control group. Oral administration of red grape juice and kiwi juice at deferent levels reduced potato chips hazards. So, the present study revealed that frequent consumption of potato chips caused a lot of harmful effects of health but the regular consumption of grape juice and kiwi juice have an important role in reduction these hazardous effects.

Key words: Red grape, Kiwi fruit, Liver functions, Hematological parameters, Lipid profile, Rats, Antioxidant enzymes, Histopathology.

تأثير عصير العنب الأحمر و عصير الكيوى على خفض مخاطر البطاطس الشيبس فى فئران التجارب

الملخص العربى

في الوقت الحاضر ، من الشائع والسهل تناول الأطعمة الغير صحية وخاصة البطاطس الشيبس التي لها قيمة غذائية منخفضة ومغذيات دقيقة منخفضة ومحتوى عالى من الدهون والسعرات الحرارية. أجريت هذه الدراسة لمعرفة تأثير التدعيم الغذائى لعصير العنب الأحمر وعصير الكيوي للحد من مخاطر البطاطس الشيبس في فئران التجارب. من المعروف أن عصيرالعنب الأحمر وعصير الكيوي غنيان بالبوليفينولات ونشاط مضادات الأكسدة. تم استخدام اثنان واربعون فأرا يزنوا من ١٥٠± ٥ جرام وتم توزيعهم بعد فترة التكيف (٧ أيام) الى ٦ مجموعات رئيسية (٧ فأر للمجموعه) . المجموعة الاولى (العدد = ٧ فئران) وهى المجموعة الضابطة السالبه وتم تغذيتهم على الغذاء الاساسى. المجموعه التانيه تم تغذية الفئران على الغذاء الأساسى المدعم ب ٢٠% بطاطس شيبس وتعتبر المجموعه الضابطة الموجبة. المجموعه الثالثة والرابعه تم تغذية الفئران على الغذاء الأساسى المدعم ب ٢٠% بطاطس شيبس وتم تجريعهم بالفم ٥ ميللى و ١٠ميللى يوميا عصير عنب أحمر لمدة ستة أسابيع على التوالى . وفى نهاية فترة التجربة (٦ أسابيع) تم الحصول على عينات السيرم للاجراء التحاليل المعملية. تم حساب المأخوذ اليومى من الغذاء المتناول وحساب معدل الزيادة فى الوزن.

بالإضافة الى , تم تقدير ALT AST ونيتروجين اليوريا , الكرياتينين, دهون الدم ,مضادات اللأكسدة ومستوى المونالدهيد (MDA) بالإضافة الى الفحوصات الدموية. تم عمل الفحوصات التشريحية للكبد والكلى. أظهرت النتائج أن هناك انخفاض معنوى فى انزيمات الكبد مثل ALT AST, و أيضا نيتروجين اليوريا والكرياتينين فى المجموعات ٣ ,٤, ٥ و٦ على التوالى مقارنة بالمجموعة الضابطة الموجبة. بالإضافة الى انخفاض مستوى MDA فى المجموعات المجموعات ٣ ,٤, ٥ و٦ على التوالى مقارنة بالمجموعة الضابطة الموجبة. ولكن, دهون الدم مثل الكولسترول الكلى والجليسريدات الثلاثية والليبوبروتينات منخفضة الكثافة انخفضت معنويا مقارنة بالمجموعه الضابطة الموجبة. ولكن هناك ارتفاع معنوى فى فحوص الدم , الليبوبروتين مرتفع الكثافة والانزيمات المضادة للأكسدة مثل مستوى الكتاليز فى السيرم (CAT) , مستوى SOD فى المجموعات ٣,٤,٥ و ٦ على التوالى بالمقارنة بالمجموعه الضابطة الموجبة. تناول عصير العنب الأحمر و عصير الكيوى فى الفم بمستويات مختلفة أدى الى انخفاض مخاطر البطاطس الشيبس. لذلك ، كشفت الدراسة الحالية أن الاستهلاك المتكرر للبطاطس الشيبس تسبب الكثير من الآثار الضارة للصحة ولكن الاستهلاك المنتظم لعصير العنب وعصير الكيوي له دور مهم في الحد من هذه الآثار الضارة.

الكلمات المفتاحية:
العنب الأحمر , فاكهة الكيوى , وظائف الكبد, فحوصات الدم, دهون الدم, الفئران, مضادات الاكسده و الفحوص التشريحية.

Introduction

Potato chips are a common snack in the world it is typically high in fat and calories, which can raise the risk of weight gain, dyslipidemia, decrease the hemoglobin and other of hematological profile in addition obesity. Weight gain associated with potato chips intake is a common reason of a lot of health problems such as hypertension, hyperlipidemia, diabetes mellitus ***(Duran et al., ٢٠٠٧).***

One potential mechanism that could explain the health problems of potato chips is the high glycemic load. Glycemic load is a measurement that reflects how a serving of a specific food affects glucose concentrations in the human body. The postprandial hyperglycemia that follows a high glycemic load meal has been associated with endothelial dysfunction, oxidative stress, and inflammation, all potentially important mechanisms in the development of hypertension ***(Ceriello et al., ١٩٩٨, Title et al., ٢٠٠٠ and Ludwig, ٢٠٠٢).***

Frequent potato chips consumption can contribute to high cholesterol levels because of the amount and type of fat found in chips. Most chips are deep-fried, a process that creates trans fats, the most harmful type. Also, the oils used for frying chips are often saturated fats, which also contribute to high cholesterol levels. High levels of trans fat in the diet are correlated to high levels in the blood. High levels of trans fats in the bloodstream are associated with high levels of LDL cholesterol and an increased risk of coronary heart disease. In addition, high intake of sodium in potato chips can cause an increase in blood pressure, which can lead to stroke, heart failure, coronary heart disease ***(Stanley, ٢٠٠٧).***

Healthful products from fruit have obtained considerable attention in recent years for their diverse pharmacological properties, including antioxidants ***(Takeoka and Dao, ٢٠٠٣)***. Red grape are a rich source of nutrients and phytochemicals, red grape contains many saponins, alkaloids, flavonoids and steroids. It is a natural antioxidant as a result of occurrence of glutathione.

Red grape contain a variety of antioxidants and polyphenols. Antioxidants neutralize harmful free radicals to help prevent the process of oxidation that damages cells but in fact, neutralizing free radicals happens naturally if we eat foods like grapes that promote antioxidant activity. When free radicals are left to their own devices, a condition called "oxidative stress" occurs. Oxidative stress is now associated with numerous health conditions and chronic illnesses. Red grapes are an excellent source of vitamin K, which plays a key role in helping blood to clot in order to prevent excessive bleeding and may also be important in bone health. Grapes contain ٧٪ of the recommended daily intake of potassium ***(Imran et el., ٢٠١٧)***.

Red grapes and its juices are the major source of dietary resveratrol in humans and have both chemo-preventive and therapeutic properties against various diseases. Also, red grape have numerous implications for human health. Red grape has been useful for reducing the extent of diabetes mellitus, digestive problems and cardiovascular disorders. The review elaborates the health claims of various chemical components of grapes and their functional roles, with special reference to antioxidant potential, immune-nutrition, anticancer perspectives and cardiovascular cure ***(Imran et el.,* ٢٠١٧)**.

Kiwi fruit can be described as nutritious, providing an excellent source of vitamin C and a good source of folate and potassium ***(Ferguson A. and Ferguson L.,* ٢٠٠٣).** One fruit provides approximately ١٠ % of the recommended daily requirement of dietary fiber. The dietary fiber in kiwi can also provide heart benefits by lowering the triglycerides. The vitamin K in kiwi also promotes healthier, stronger bones ***(Denise et al.,* ٢٠١٢)**.

Kiwi also contains vitamin E and a range of phytochemicals and carotenoids that might also be beneficial to health. Kiwi contains Phytochemicals which including beta-carotene, lutein, anthocyanins, and ellagic acid. These phytochemicals reduce the risk of heart disease, certain types of cancer, cataracts, and macular degeneration ***(kopparapu,* ٢٠١١** *and* ***Pincemail et al.,* ٢٠١١).** In addition, Kiwifruit had the strongest antioxidant effects which may prevent the development and deterioration of diseases caused by oxidative stress. Kiwi fruit can be made a delicious part of every meal; they can be eaten fresh as a snack, or as a part of a meal or cooked ***(Iwasawa et al.,* ٢٠١١** *and* ***Donno et al.,* ٢٠١٣).**

Aim of the study

This study was conducted to evaluate the effect of red grape juice and Kiwi juice at two different levels (٥ and ١٠ml) to reduced potato chips hazards.

Materials and methods

Materials:

Fruit: The mature fresh red grape and kiwi were purchased from local markets in Egypt and identified by Department of Taxonomy, Faculty of Science, Cairo University.

Rats: Forty two adult male albino rats of Sprague Dawley strain, weighing (١٥٠±٥g.) were purchased from Helwan Farm for Experimental Animals, Cairo, Egypt.

Chemicals: Kits for biochemical analysis were purchased from Biodiagnostic Company for Pharmaceutical and chemicals, Dokki, Egypt. Casein, vitamins, minerals, cellulose, starch, and choline were obtained from Morgan Chemical Factory, Cairo, Egypt.

Methods:

Preparation of Red grape juice and Kiwi juice:

The fresh red grape fruits and Kiwi fruits were washed by using tap water to remove possible potential pathogenic microorganisms and dust, then prepared by mixing ٨٠ g of red grape or kiwi fruit pulp with ٢٠ ml water using electric blender.

Determination of Phenolic Compounds:

Phenolic compounds were determination by HPLC according to the method of ***Goupy et al., (١٩٩٩)***

Determination of Antioxidant Activity and Total Carotenoid:

Antioxidant activity and total carotenoid were determined according to the methods described by ***Politeo et al., (٢٠٠٦)*** and ***Horwitz and Latimer, (٢٠٠٧).***

Experimental Animal Design:

Forty two adult male rats of Sprague Dawley strain weighing ١٥٠±٥g body weight used in this study. The rats were purchased from the Laboratory Animal Colony, Helwan, Egypt. The animals were housed under hygienic conditions at a room temperature of ٢٥ ± ٢ °C with moderate humidity of ٥٠–٦٠٪ in the Animal House of Agricultural Research Center, Giza, Egypt. Basal diet and water were allowed *ad libitum.*

Preparation of Basal Diet:

Basal diet was prepared according to ***Reeves et al. (١٩٩٣)***. It consists of ٢٠ % protein, ١٠ % sucrose, ٤.٧٪ corn oil, ٢٪ choline chloride, ١٪ vitamin mixture, ٣.٥ % salt mixture and ٥٪ fibers. The remainder was corn starch up to ١٠٠ %.

Animals were divided into six main groups (n=٧, once). The first main group (n=٧) were fed on the basal diet during the experimental period as a negative control group (-ve). The second main group rats fed on basel diet supplemented with ٢٠٪ potato chips as a positive control group (+ve). Group ٣ and ٤ rats fed on basel diet supplemented with ٢٠٪ potato chips in the same time by oral gavage ٥ and ١٠ ml from ٨٠٪ water red grape Juice, respectively. Group ٥, ٦ rats fed on basel diet supplemented with ٢٠٪ potato chips in the same time by oral gavage ٥ and ١٠ ml from ٨٠٪ water kiwifruite Juice, respectively.

At the end of the experiment (٦weeks) all rats fasted over–night, lightly anesthetized under ether. Blood was withdrawn into clean dry centrifuge plastic tubes. Blood samples were centrifuged and serum were obtained then stored at -٢٠° C in a clean well stopped vial until analysis.

Biochemical Analysis:

Determination of Serum Liver Enzymes:

The enzyme alanine amino transeferase (ALT) was determined in serum to the method of ***Sherwin (١٩٨٤).*** The enzyme aspartate amino transeferase (AST) was determined according to ***Young (١٩٩٠).***

Determination of Serum Kidney Functions:

Serum urea nitrogen concentration was determined by the method ٠f ***Fossati et al., (١٩٨٠)***. However, Creatinine was determined according to the method described by ***Henry (١٩٧٤)***.

Determination of Serum Malondialdehyde:

Serum malondialdehyde (MDA) was determined according of ***Draper and Hadly, (١٩٩٠).***

Determination of Catalase (CAT):

Serum CAT activity was measured in tissue homogenate according to ***Aebi (١٩٨٤).***

Determination of Superoxide Dismutase (SOD):

Serum SOD activity was measured according to ***Nishikimi et al., (١٩٧٢)***.

Determination of Lipid Profile:

Total cholesterol in the serum was determined according to the method described by ***Allain et al., (١٩٧٤).*** Triglycerides were determined according to the method described by ***Fossati and Principe, (١٩٨٢).*** HDL was determined by the method of ***Lopesvirell et al., (١٩٧٧)***. The concentration of low density lipoprotein (LDL) and very low density lipoprotein (VLDL) cholesterol were estimated according to the equation of ***Friedewald et al., (١٩٧٢).***

Determination of Hematological Profile:

Heamoglobin (Hb) and heamatocrit (HcT) concentrations were determined according to ***Drabkin (١٩٤٩) and Inory (١٩٥٤)***, respectively. Red blood cells (RBCs) and white blood cells (WBCs) count were estimated according to ***Dacie and Lewis, (١٩٩٨),*** respectively.

Statistical Analysis:

Autopsy samples were taken from the liver and kidney of rats in different groups and fixed in ١٠٪ formalin solution. The results were expressed as mean ± standard error (SE). The statistical analysis was carried out by using SPSS, PC statistical software (Verion ١٨.٠ SPSS Inc., Chieago, USA) using the Dunk 'test multiple range post-hoc test. Data were analyzed by one way analysis variance (ANOVA). The values were considered significantly different at P <٠.٠٥ ***(Snedecor and Cochran, ١٩٨٠)***.

Results and Discussion

Chemical Composition of Red Grape and Kiwi Fruits as Raw Materials

Chemical composition of Kiwifruits was investigated on fresh weight basis. The following parameters were determined for moisture, protein, ash, carbohydrate, crude fiber, fat and the contents of vitamins (B١, B٢, vitamin C, folate, vitamin A, total carotnoids and vitamin E) in addition some minerals including (Ca, Na, K, Fe, Mg, Zn,) and total antioxidant activity by DPPH%. On the other side, results in Table (٢) indicated that Kiwifruit had the highest contents of these vitamins and minerals including vitamin C, total carotnoids, Vitamin E, Vitamin A, Ca, Na, and total antioxidant .On the other hand, these results are the same line with those reported by ***Singletary, (٢٠١٢)*** and ***Donno et al., (٢٠١٣)*** they demonstrated that Kiwi are excellent sources of the ascorbic acid. According to ***Cangi, et al., (٢٠١١)*** indicated that Kiwifruit is one of the major dietary sources of various antioxidant for humans, and it's particularly also contains a wide range of other phytochemicals. In addition, ***Solanki and Bhatt, (٢٠١٠)*** showed that the natural antioxidants such as vitamin-C , β-carotene and vitamin E prevent lipid peroxidation in the body. In fact from our results showed that red grape and Kiwifruits have major source of various types of nutrients with promising evidence of health benefits.

Chemical composition of red grape showed in table ١ and ٢ according to ***Salem A. and Saltana, (٢٠١٥)*** whose demonstrated that red grape have a high content of calcium, magnesium, phosphor, potassium, iron, vitamin A, vitamin C and total phenolic content.

Table (١): Chemical Composition of Red Grape and Kiwi Fruits (g/١٠٠g edible portion).

Chemical composition	Red Grape	Kiwi
Moisture	٧٣.٦٠	٨٠.٨١
Protein	٢.٣٠	٠١.١٩
Carbohydrate	٢٦.٤٠	٠٩.٥١
Fat	٥.١٠	٠٠.٦١
Ash	٠.٤٢	٠٣.٣١
Curde fiber	١١.٢٠	٠٤.٨١

Table (٢): Vitamins and Minerals Content of Red Grape and Kiwi Fruit (mg / ١٠٠g edible portion).

Vitamins and minerals	Red Grape	Kiwi
Vitamin C	١٠.٦٣	٩٥.٥٥
Vitamin B١	٠.٠٦٩	٠٠.٠٥
Vitamin B٢	٠.٠٧	٠٠.٠٣
Vitamin E	٠.١٩	١.٥٥
Folate (µg)	٠.٠٠٢	-
Total carotenoids	١٣١	٤.٣٣
Vitamin A (µg)	٨٢	١٠٤.٠٠
Ca	١٦	٣٠.٦٠
NA	٠.٠٤٤	٠٣.٠١
K	١٩٥	٣١٢.٥٠
Fe	٠.٧٣	٠٠.٣١
Zn	٠.٩٨	٠٠.١٤
Mg	٨.٠٠	١٧.٠٢
Total antioxidant activity by DPPH% (µg/ml)	١١.٦٥	٦.١٦

Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Nutritional Parameters of Rats

The mean value of feed intake (g/day for each rat) and body weight gain % of rats fed negative control group, positive control group were investigated and summarized in Table (٣). Results revealed that the positive control group caused significant increase (P<٠.٠٥) in the mean value of feed intake compared to the negative control group (٣٥.٥٠±٠.٣١ and ١٤.٣٣±٠.٢٧ respectively). Oral administration of grape juice (٥ ml from ٨٠٪ water red grape) caused significantly decreased feed intake compared to the positive control group (٢٨.٣٦ ±٠.٤٩ , and ٣٥.٥٠±٠.٣١, respectively) also body weight gain decreased significantly in group ٣ when compared with positive control group. When rats administrated ١٠ ml of red grape juice the feed intake and body weight gain decreased significantly compared to positive control group. In the same line when rats administrated ٥ ml and ١٠ ml of kiwi juice feed intake and body weight gain decreased significantly compared to the positive control group.

Tabulated results indicated that when rats administrated of red grape juice in groups ٣ and ٤ feed intake and body weight gain decreased significantly when compared with positive control group because red grape low in calories and virtually fat free so, red grape may help accelerate the pace of body weight loss programme. Red grape have a natural source of resveratrol, a powerful antioxidant that might also have some weight loss benefits, and they also offer a small amount of satiating fibre. Eating red grapes may give a great weight loss results too. This is because ellagic acid found only in red grapes is known to have positive fat-burning effects. Ellagic acid helps in slowing down the growth of existing fat cells in our body and deters the formation of new fat cells.

The feed intake and body weight gain in groups ٥ and ٦ decreased significantly as compared to control positive group, this data agree with ***Makni et al., (٢٠٠٨)*** and ***Barakat, (٢٠١١). Renée et al., (٢٠١٨)*** indicted that when ٤١ people with prediabetes eats two kiwis per day for ١٢ week which higher vitamin C levels, a reduction in blood pressure, and a ١.٢-inch (٣.١cm) reduction in waist circumference.

Table (٣): Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Nutritional Parameters of Rats

Parameters / Groups	FI (g/day)	BWG (g)
G١ (Control -ve)	١٤.٣٣±٠.٢٧[d]	١٣.٦٦ ± ٠.٨٨
G٢ (Control +ve ٢٠٪ Potato)	٣٥.٥٠±٠.٣١[a]	٤٢.٦٦±٦.٤٨
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	٣٦ ±٠.٤٩[b].٢٨	١٨.٠٠ ±٢.٦٤
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	٣١.٦٠±٠.٩٢ [ab]	٢٠.٦٦±٤.٦٦
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	٢٦.٦٨±٠.٤٩[bc]	١٩.٣٣ ±٣.٨٤
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	٢٤.٧٠±٠.١٩[c]	٢٢.٦٦±١. ٢٠

Values are expressed as means ± SE.
Values at the same column with different letters are significantly different at P<٠.٠٥.

Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Liver Functions of Rats

The activities of serum ALT and AST enzymes in all groups are presented in table (٤). The mean values of ALT and AST activities were increased in positive control rats which were ٢١.٣٣±١.٨٥ and ٤٠.٠±٢.٠٨ U/L, respectively, compared to negative control group with the mean values of ١٩.٦٦±٢.٧٢ and ٣١.٣٣±٣.٢٨ U/L, respectively. The levels of above enzymes activity were reduced in all treated groups when compared with positive control group.

The results in the same line with ***Mukherjee et al., (٢٠١٢) and Jimenez et al., (٢٠٠٤)*** whose demonstrated that intake of red grape decreased the serum levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST), blood markers of liver damage. Additionally, enhanced levels of ALT and AST in group of red grape supplemented. Moreover, treatment with ٥٠ mg/kg red grape alone was unlikely to produce a significant alteration in the rat liver weight as well as the activity of transaminase enzymes.

A common antioxidant called pyrroloquinoline quinone, or PQQ that is found in soil and many foods, including kiwi, was found to protect mice against the liver disease. When given to obese mouse mothers during pregnancy and lactation, PQQ protected their offspring from developing symptoms of liver fat and also prevented damage that could lead to developing the liver disease.

Table (٤): Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Liver Functions of Rats

Parameters / Groups	ALT(U/L)	AST(U/L)
G١ (Control -ve)	١٩.٦٦±٢.٧٢^{ab}	٣١.٣٣±٣.٢٨^{b}
G٢ (Control +ve ٢٠٪ Potato)	٢١.٣٣±١.٨٥^{a}	٤٠.٠±٢.٠٨^{a}
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	١٩.٦٦ ±٠.٨٨^{ab}	٣٢.٦٦±٣.٧١^{b}
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	١٧.٣٣±٠.٨٨^{b}	٣٧.٣٣±١.٤٥^{ab}
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	١٨.٠٠±٢.٠٨^{b}	٢٩.٠٠±٤.٣٥^{b}
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	١٧.٣٣±٠.٨٨^{b}	٣١.٠٠±١.٥٢^{b}

Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Kidney Functions of Rats

The effect of administration of red grape juice and kiwi juice at different levels on kidney functions such as creatinine and urea nitrogen is showed on table (٥). Results showed significantly increased of serum creatinine and urea nitrogen in positive control group which were ٤١.٨٦±٤.٠٦, ١.٠٣±٠.٠٨ mg/dl, respectively when compared with the negative control rats which were ٣٨.٥٦±٣.٠١٧ and ٠.٩١±٠.٠٩ mg/dl, respectively. When rats administrated orally red grape juice and kiwi juice (٥ml and ١٠ ml) serum urea nitrogen and creatinine decreased significantly (*P* < ٠.٠٥) when compared with the positive control group as shown in table (٥).

Red grape improves some kidney function parameters as it enhances GFR and clearly lowers proteinuria. ***Zeeuw et al., (٢٠٠٤)*** demonstrated that red grape importance as reduction in proteinuria to the lowest achievable level is an important predictor of long term renal protection, as it is increasingly recognized that proteinuria may actually be pathological and etiological in CKD progress and not just symptomatic. Red grape effect on plasma, urine urea and uric acid, its clinical use could be envisaged as a uric acid-lowering therapy substitute to allopurinol. High potassium intakes of kiwi are also associated with a reduced risk of stroke, protection against loss of muscle mass, preservation of bone mineral density, and reduction in the formation of kidney stones.

Table (٥): Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Kidney Functions of Rats

Parameters / Groups	Urea Nitrogen *(mg/dl)*	Creatinine *(mg/dl)*
G١ (Control -ve)	٣٨.٥٦±٣.٠١٧[ab]	٠.٩١±٠.٠٩[ab]
G٢ (Control +ve ٢٠٪ Potato)	٤١.٨٦±٤.٠٦[a]	١.٠٣±٠.٠٨[a]
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	٣٤.٦٠±١.٨٠[b]	٠.٨٠±٠.٠٥[b]
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	٣٤.٠٣±٠.٢٤[b]	٠.٧٧±٠.٠٣٩[b]
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	٣٤.٢٠±٠.٩٢[b]	٠.٧٥±٠.٠٢٨[b]
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	٣١.٨٦±٠.٧٨[c]	٠.٧٢±٠.٠١٤[b]

Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on on Lipid Profile in Rats

Data in table (٦) showed that addition of potato chips on basel diet in normal rats caused significant (*P* < ٠.٠٥) increased lipid profile in serum such as TC, TG, LDL-C and VLDL-C in positive control group compared with negative control group however, there were significant decrease in serum HDL-c in positive control group when compared to other all groups. On the other hand, the oral administration of red grape juice and kiwi juice at different levels (٥ml and ١٠ ml) had decreased in serum levels of TC, TG, VLDL-c, and LDL-c as compared to the positive control group, While had a significant increase (p<٠.٠٥) in serum level of serum HDL-c, compared to the positive control group. The greatest decrease of lipid profile was noted for group (٦) when rats fed on diet supplemented with ٢٠٪ potato chips and given orally ١٠ ml kiwi juice daily for ٦ weeks.

Red grape and kiwi and fruits contained the antioxidant including flavonoid compounds and vitamins which inhibit oxidation of low density lipoprotein (LDL-C), a critical event in the pathogenesis of atherosclerosis through alternative mechanisms, including improvement of endothelial function, inhibition of platelet agreeability and a decrease in the risk of plaque rupture ***(Fayed et al., ٢٠١٠)***.

Hansen et al., (٢٠٠٥) indicated that red grape consumption is associated with beneficial changes in blood lipids and fibrinogen that may help to reduce the cardiovascular risk factors. The polyphenols of red grape have virtually no effect on the investigated traditional risk factors for CVD.

This results at the same line with ***Brevik et al., (٢٠١١)*** whose noted that Kiwifruit intervention improved blood antioxidant status and lowered markers of lipid peroxidation. Diet supplemented with Kiwifruits per day decreased fasting plasma TG levels but did not affect plasma levels of total cholesterol, HDL, LDL or glucose. Moreover, ***Rodriguez et al., (٢٠١٣)*** showed that some trace elements of kiwi contribute to the function of endogenous antioxidant enzymes by acting as cofactors, and most polyphenols can act as chain breakers or radical scavengers and prevent the oxidation of low density lipoproteins (LDL). Also, kiwi rich in vitamin C which reduces the tocopheroxyl radical formed by interaction of α-tocopherol with lipid peroxides in cell membranes, this demonstrates the wide variety of reactive intermediates vitamin C interacts to maintain the function of cellular components. In addition kiwi have Lutein which a carotene that prevents the eyes from developing cataracts. Beta sitosterol can inhibit the absorption of cholesterol by the intestine leading to a lower concentration of cholesterol in blood published by ***(Moreno et al., ٢٠٠٧; Naveh et al., ٢٠١٣*** and ***Fulgoni et al., ٢٠١٣).***

These results are supported by the findings of ***Chang et al., (٢٠١٠)*** they indicated that consumption of two Kiwifruit per day for ٨ weeks by hypercholesterolemic subjects appeared to reduce some indices of blood lipid profiles and was associated with diminished LDL, VLDL, and TC.

Table (٦): Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Lipid Profile in Rats

Parameters / Groups	TC (mg/dl)	TG (mg/dl)	HDL-C (mg/dl)	LDL-C (mg/dl)	VLDL-C (mg/dl)
G١ (Control -ve)	٧٢.٤٣±٢.٥٤[bc]	٨٩.٠±٥.١٩[d]	٤٧.٦٦±٠.٨٧[bc]	٣٩.٠٣±١.٨٤[d]	١٧.٨٠±١.٠٣ [b]
G٢ (Control +ve ٢٠٪ Potato)	١١٩.٤٠±٨.٤١ [a]	١٨١.٦٣±٢٨.٢٥[a]	٤١.٠٠±٣.٢٩[c]	٧٦.١٦±٦.٠٧[a]	٢٢.٧٠ ±٥.٦٥[a]
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	٨٤.٦٠±٦.٩٩[b]	١٢٤.٠٣±١٣.١٠[b]	٥٦.٠٣±٥.٠٦[ab]	٥٣.٨٣±٣.٥٠bc	٢٢.٣٠±٢.٠٨[a]
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	٧٢.١٦±١.٥٣[bc]	١٠٥.٢٦±٩.٢٤[c]	٥٤.١٣±٣.١٤[b]	٤٨.١٦±٠.٧٣[bc]	٢١.٠٥±٢.٠١ [a]
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	٧٥.٨٦±٨.٠٨[bc]	١٠٦.٠٠±٢.٠٢[c]	٦١.٩٠±٦.٨٥[a]	٥٨.٧٦±٣.٨٢[b]	٢١.٢±٠.٤٠٥ [a]
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	٥٦.٣٦ ±٢.٢٤[c]	١٠٤.٣٦±٧.٠٥[c]	٥١.١٦±٤.٨٥[b]	٣٦.١٣±١.٧٩[d]	٢٠.٧٨±١.٤١[ab]

Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Serum Concentrations of Antioxidant Activity and Malondialdehyide on Rats

The effect of administration of red grape juice and kiwi juice at different levels on serum concentrations of antioxidant activity such as CAT and SOD in addition Malondialdehyide presented in table (٧). Results showed that there were significantly decreased of serum CAT and SOD in positive control group when compared with the negative control group. However, serum CAT and SOD increased significantly (P < ٠.٠٥) in groups ٣, ٤, ٥ and ٦ significantly when compared with the positive control group. Moreover, the best value of CAT was noted in group ٦ but the great value of SOD was noted in group ٣. On the other hand, results showed that there were increased of malondialdehyide significantly in positive control group when compared to the negative control group. Serum MDA in groups ٣, ٤, ٥ and ٦ groups were decreased significantly (P < ٠.٠٥) when compared with the positive control group.

Red grape and Kiwifruits have a fairly high phenolic content in comparison to some other fruits ***(Venter, ٢٠١٣).*** Fruit and vegetables generally have a high phenolic content, with the composition varying between different kinds ***(Imeh and Khokhar, ٢٠٠٢).*** Phenolic compounds are secondary metabolites abundant in fruit and vegetables and have various functional attributes***)***. The interest in phenolic compounds has increased over recent years due to their potential health benefits, protective function ***(Kim and Lee, ٢٠٠٥).***

Total antioxidant capacity of red grape and Kiwifruit reported greater than grapefruit, apple, and pear ***(Beekwilder et al., ٢٠٠٥).*** In vitro antioxidant assays of several fruit juices including those prepared from red grape and kiwifruit juice was determined to be a rich source of potentially antioxidant polyphenols ***(Iwasawa et al., ٢٠١١).*** Furthermore, Kiwifruit juice was observed to be a potent inhibitor of lipid oxidation and an effective eliminator of the oxidative stress inducing agent hydrogen peroxide (H٢O٢) showed by ***Venter, (٢٠١٣).***

In addition, higher concentration of resveratrol, a component of grape juice, acting on free radicals and defending the organism against possible inflammation (***Shivraj et al., ٢٠١٣***). SOD is a mitochondrial antioxidant enzyme encoded in the nucleus, it is essential for the removal of superoxide radicals. CAT immunoexpression increased in the group treated with grape juice ١٪. ***Costa et al., (٢٠١٢)*** indicated that CAT is an important enzyme in response of oxidative stress by catalyzing the hydrolysis reaction of hydrogen peroxide molecules in water and oxygen. In this way, it can be suggest a possible protective role of grape juice treatment.

Table (٧): Effect of Administration of Red Grape Juice and Kiwi Juice at Different Levels on Serum Concentrations of Antioxidant Activity and Malondialdehyide on Rats.

Parameters / Groups	CAT (U/ml)	SOD (m mol/ml)	MDA (u/ml)
G١ (Control -ve)	٠.٩٧±٠.٠٣[b]	١٣٩.١١± ٣٥.١١[c]	٠.٨٣±٠.١٥[b]
G٢ (Control +ve ٢٠٪ Potato)	٠.٨٩±٠.٠٢[c]	١١٩.٥٤±٤٢.١٧[d]	١.١٤±٠.٠٥[a]
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	١.٠٧±٠.٠٦٢ b	٢٦٠.٣٠±١٦.٧٨[a]	٠.٦٥±٠.٢٠
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	١.٠٧±٠.٠٤٢ b	٢٠٨.٥٨±٤٣.٣٦[bc]	٠.٩٦±٠.٣٥[ab]
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	١.٢٣±٠.١٤[a]	٢١٩.١٤±٢.٧٧[b]	٠.٩٣±٠.٠٤١[ab]
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	١.٣٦±٠.٠٨[a]	٢٠٤.٢٣±٣.٠٩[bc]	٠.٧٣±٠.٠٣٣[c]

Effect of Administration of Red Grape juice and Kiwi Juice at Different Levels on Hematological Profile on Rats.

A result of red grape juice and kiwi juice at different levels on hematological profile such as Hemoglobin, RBC, WBC, PCV lymph, meuto, mono and corin concentrations of rats are noted in Table (٩). Results revealed that positive control group had significant decrease (P<٠.٠٥) in all hematological profile when compared with other groups. However, when rats administrated orally of red grape juice and kiwi juice at different levels (٥ml and ١٠ ml) all hematological profile had improved than positive control group. The greatest increase in the relative red blood cell parameters concentrations was obtained in group ٣.

The results in the same line with ***Nora* , ٢٠١٨** who demonstrated that red grape improved iron status, serum iron, transferrin/total iron-binding capacity (TIBC), transferrin saturation, and ferritin are widely used in clinical practice,

Consumption of Gold kiwifruit has also been shown to improve Fe absorption in women with low-Fe status, probably due to the ability of vitamin C to enhance the absorption of non-haem Fe (***Beck et al.,* ٢٠١١***)*. Kiwifruit are also a good source of vitamins K and E, folate, fibre, polyphenols and carotenoids, and these compounds may also confer health benefits. Kiwifruit have been shown to improve digestive health, modulate lipid profiles and reduce platelet aggregation ***(Rush et al.,* ٢٠٠٢*)*.** Kiwifruits have anticoagulation properties, diminish liver enzyme activity, and influence the RBC system in blood. Kiwifruits 'Hayward', regardless of the crop and postharvest ripening, affect pro-health properties and can be recommended particularly in patients with hyperlipidemia and hypercholesterolemia ***(Maria et al.,* ٢٠١٣*)*.**

In conclusion, red grape and kiwifruits have higher amounts of bioactive compounds and antioxidant capacity than other fruits. The high amounts of polyphenols, flavonoids, and vitamin C, as well as a high antioxidant capacity, influenced the values of total cholesterol in the plasma of rats from groups containing conventional. A significant improvement in lipid parameters such as TC, LDL-C, and TG in rats fed diets containing kiwifruit was observed. This study showed that the increase in consumption of vitamin C was associated with an increase in HDL-C and decrease in total cholesterol and triglycerides.

Table (٨): Effect of Administration of Red Grape juice and Kiwi Juice at Different Levels on Hematological Profile on Rats.

Parameters / Groups	Heam-oglobin (mg/dl)	Red bold cells (mg/dl)	White blood cells (mg/dl)	PCV	LYMPH	MEUTO	MONO	CORIN
G١ (Control -ve)	١٢.٢٤±٠.٣٣^{a}	٥.٠٣±٠.١٧^{b}	٦٢٨٣.٣٣±١٦٠٦.٣٢^{b}	٤١.٣٣±٠.٨٨^{a}	٤٠.٠٠±٤.٠٤^{ab}	٥١.٠٠±٣.٠٥^{ab}	٤.٦٦±٠.٦٦^{ab}	٢.٦٦±٠.٣٣
G٢ (Control +ve ٢٠٪ Potato)	١٠.٩٤±١.٧٧^{b}	٥.٠٠±٠.١٨^{b}	٧٨٩٠.٠٠ ±٥٢٠.٠٣^{a}	٣٥.٠٠±١.٥٢^{b}	٤٩.٦٦±٢.٩٠^{a}	٤٣.٣٣±١.٧٦	٥.٣٣±٠.٣٣^{a}	٣.٠٠±٠.٥٧^{b}
G٣ (Potato٢٠٪ +٥ ml Grape Juice)	١٢.١٦±٠.٠٨^{a}	٦.٨١±١.٧١^{a}	٦٥٠٠.٠٠±١١٩٣.٠٦^{ab}	٣٨.٠٠±٠.٥٧^{ab}	٣٨.٠٠±٢.٥١^{b}	٥٣.٠٠±١.٠٠^{a}	٣.٣٣±٠.٣٣^{b}	٣.٣٣±٠.٦٦^{b}
G٤ (Potato٢٠٪ +١٠ ml Grape Juice)	١٢.٠٦±٠.١٤^{a}	٤.٥١±٠.١٦^{b}	٧٠٣٣.٣٣ ±٢٩٦.٢٧^{ab}	٣٩.٣٣±١.٢٠^{ab}	٣٨.٦٦±٢.٦٠^{b}	٥٤.٠٠±٠.٥٧^{a}	٥.٠٠±٠.٥٧^{a}	٤.٠٠±٠.٥٧^{a}
G٥ (Potato٢٠٪ +٥ ml Kiwi Juice)	١١.٩٠±٠.١٠^{ab}	٤.٧٠±٠.٠٧^{b}	٦٩٦٦.٦٧ ±٦٣٥.٩٥^{ab}	٣٨.٦٦±٠.٨٨^{ab}	٤١.٠٠±١.٥٢^{ab}	٥٠.٦٦±٢.١٨^{ab}	٣.٦٦±٠.٣٣^{b}	٣.٣٣±٠.٣٣

								b
G٦ (Potato٢٠٪ +١٠ ml Kiwi Juice)	١٢.٢٣±٠.٠٨[a]	٥.٥٣±٠.١٢[b]	٤٩٧٦.٦٧ ±٣٢١.٧٦[c]	٤٠.٠٠±٠.٥٧[a]	٣٨.٠٠±١.٥٢[b]	٥١.٠٠±٣.٠٥[ab]	٣.٦٦±٠.٦٦[b]	٤.٣٣±٠.٣٣[a]

Histopathological Examination of Liver:

Microscopically, liver of rats from negative control group revealed the normal histological structure of hepatic lobule (Figs. ١). Some examined sections from positive control group showed slight vacuolation of hepatocytes and slight fibroplasia in the portal triad (Fig. ٢). Moreover, no histopathological changes were noticed in examined sections from groups ٣, ٤, ٥ and ٦ except slight activation of Kupffer cells (Figs. ٣, ٤, ٥ & ٦).

Histopathological Examination of Liver

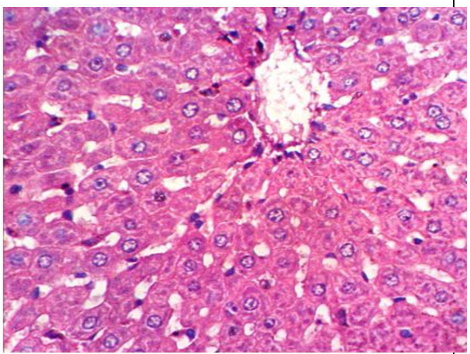

Fig. (١): Liver of rat from group ١ showing the normal histological structure of hepatic lobule (H & E X ٤٠٠).

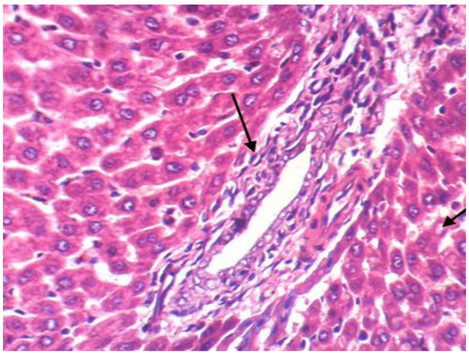

Fig. (٢): Liver of rat from group ٢ showing slight vacuolation of hepatocytes and slight fibroplasia in the portal triad (H & E X ٤٠٠).

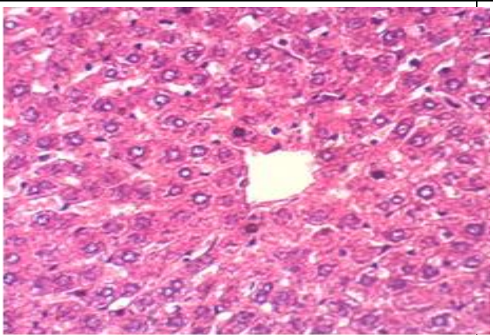

Fig. (٣): Liver of rat from group

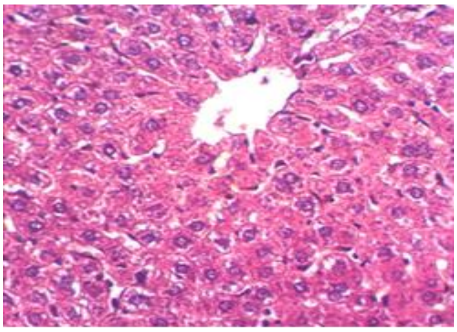

Fig. (٤): Liver of rat from group

٣ showing no histopathological changes.	٤ showing no histopathological changes .
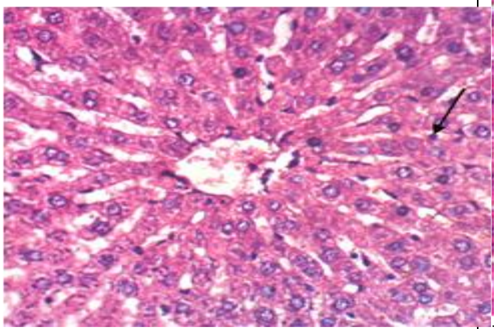	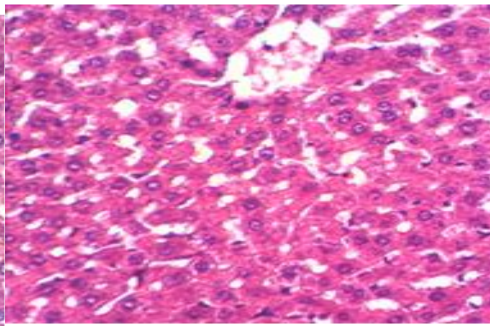
Fig. (٥): Liver of rat from group ٥ showing slight activation of Kupffer cells.	**Fig. (٦):** Liver of rat from group ٦ showing no histopathological changes.

Histopathological Examination of Kidneys:

Microscopical examination of kidneys of rats from group ١ revealed the normal histological structure of renal tissue (Figs. ٧). However, some kidneys of rats from group ٢ revealed vacuolization of epithelial lining renal tubules (Fig. ٨). Moreover, kidneys of rats from group ٣ showed no histopathological alterations (Fig. ٩). Examined sections from group ٤ revealed no histopathological alterations (Figs. ١٠). Meanwhile, kidneys of rats from groups ٥ & ٦ showed no histopathological alterations except proteinaceous material in the lumen of some renal tubules (Figs. ١١ & ١٢).

Histopathological Examination of Kidneys

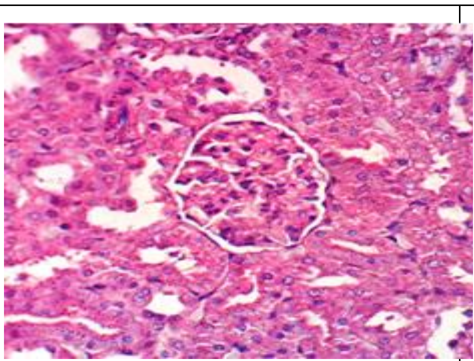

Fig. (٧): Kidney of rat from group ١ showing the normal histological structure of renal tissue

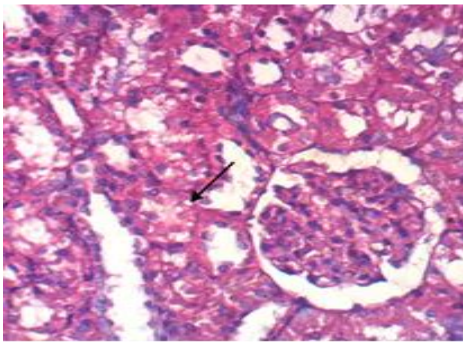

Fig. (٨): Kidney of rat from group ٢ showing vacuolization of epithelial lining renal tubules.

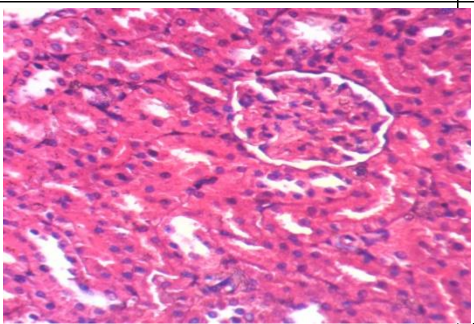

Fig. (٩): Kidney of rat from group ٣ showing no histopathological alterations.

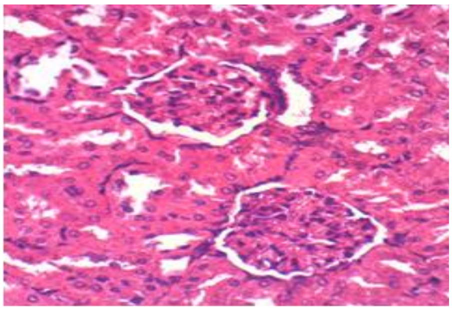

Fig. (١٠): Kidney of rat from group ٤ showing no histopathological alterations.

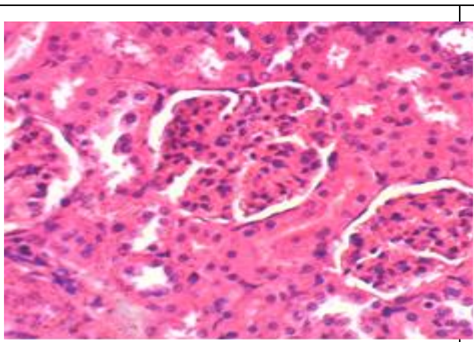

Fig. (١١): Kidney of rat from group ٥ showing no histopathological alterations.

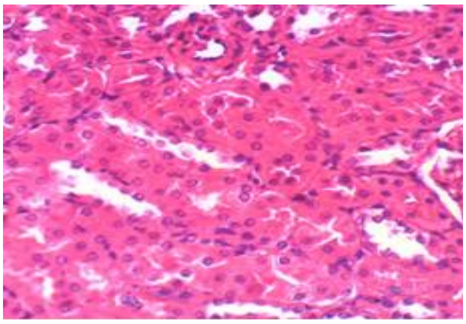

Fig. (١٢): Kidney of rat from group ٦K showing no histopathological alterations.

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