

Chemical and Biological Studies on Available Concentrated Protein in Local Market Using Experimental Animals.**Prof. Dr. Ali Badwy Rosas**

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ABSTRACT

Whey protein is a mixture of proteins in whey, which is a byproduct of cheese production. It's usually sold as a flavored powder, which is added to shakes, meal replacements and protein bars. Soybeans contain a stew of beneficial compounds such as amino acids, fiber, isoflavones and lecithins that may work synergistically to improve metrics like cholesterol numbers associated with heart health, keep in mind that highly-processed forms of soy aren't likely to have the same impact.

Beef is a complete protein, so it can provide all the amino acids that the body needs in just one source. Paleo beef protein powder is a more convenient way to get the protein the body needs.

The beverages used in this study were Concentrated Protein such as (Whey protein, Soy Protein, Beef Protein) and Diet with Oat Using in this study Forty Two (42) adult male albino rats, weigh (120±5g) were divided into 6 groups each of 7 rats.

A group of them used as a control negative, and other groups were fed on these concentrated proteins for four weeks. The study of the impact role of these concentrated proteins on BWG, FER, FI, Blood Components, CBC, Lipid Profile, Liver Function and Kidney Function.

Key words: Concentrated proteins, Biological Studies, Whey protein, Beef Protein.

INTRODUCTION

Protein is a key player in regulating the acidity (pH) in the body. Human bodies have a very small range of acceptable acidity and deviation from that can be extremely harmful. Protein is one of the “buffer systems” the body uses to maintain this range . Another balance the human body needs to maintain is with the various fluids moving through the system. Proteins help attract and retain water as necessary to keep blood circulating through the blood vessels (*Hoffman and Falvo,2004*). Whey protein is a mixture of proteins in whey, which is a byproduct of cheese production. It’s usually sold as a flavored powder, which is added to shakes, meal replacements and protein bars.Whey protein is a mixture of beta-lactoglobulin, alpha lactalbumin, bovine serum albumin, and immunoglobins(*Bounous, 2000*).Whey protein is a naturally complete protein, meaning that it contains all of the essential amino acids required in the daily diet. It has the ideal combination of amino acids to help improve body composition and enhance athletic performance. Whey protein is a rich source of BCAAs, containing the highest known levels of any natural food source. BCAAs are important for athletes since unlike the other essential amino acids; they are metabolized directly into muscle tissue and are the first ones used during periods of exercise and resistance training. Whey protein provides the body with BCAAs to replenish depleted levels and start repairing and rebuilding lean muscle tissue(*Hung et al.,2017*).

Soybeans contain a stew of beneficial compounds such as amino acids, fiber, isoflavones and lecithins that may work synergistically to improve metrics like cholesterol numbers associated with heart health, keep in mind that highly-processed forms of soy aren’t likely to have the same impact. For example, soy protein isolate a protein that has been isolated from soybeans using chemical engineering and added to everything from veggie burgers to boxed cereal won’t improve heart health(*Willim,2008*). Soy protein is a healthy and vegan appropriate way of getting protein. It is comparable in quality to casein,but digests within 2–4 hours of consumption, makingit an ideal addition to meals. Soy protein is known to be a good antioxidant and soy products often contain other healthy vitamins, but recent medical debates have questioned the possibility of several down sides to ingesting large amounts of soy(*Lien and Chio,2009*).

Beef is a completeprotein, so it can provide all the amino acids that the body needs in just one source. Paleo beef protein powder is a more convenient way to get the protein the body needs. Beef protein powders

are an especially popular additive to shakes because these are convenient to carry around no matter the activity .Beef protein powder is made from various parts of a cow, such as the bones and connective tissue. It's often very similar to collagen. It is also easier for the body to absorb. Beef protein isolate is almost entirely protein. It eliminates the carbs and fat often found in other protein powder supplements. It's also free of soy, lactose and gluten. Because there are fewer fillers used in beef protein isolates, it is easier to know how much protein you're actually ingesting and track your intake more accurately(*Aymerich et al.,2008*).

Oat has recently attracted its research and commercial attention mainly due to its high nutritional value . Oats is a good source of antioxidant vitamin E (tocols), phytic acid, phenolic acid and avenantramides. Oat is well accepted in human nutrition and it is an excellent source of different β -glucan, arabinoxylans and cellulose. It contains relatively high levels of protein, lipids (unsaturated fatty acids), vitamins, antioxidants, phenolic compounds and minerals(*Nuutila and Carlson,2000*).Oats are relatively resistant to disease and compete well with weeds, thus they can be grown with minimal amounts of fertilizers and herbicides, keeping production costs low. Compared to other crops, the low price and production cost of oats could make it a cost-effective source for the manufacture of a plant-based protein ingredient. However, manufacturers must also consider the cost of oat protein isolation(*Valentine and Cowans,2004*).

MATERIALS

Whey protein, soy protein and Beef protein were obtained from Center Star gem, Cairo, Egypt. Casein and the other content of rat's diet were obtained from Gomhoryia Co. , Dokki ,Giza, Egypt.

Fourty Two adult male albino rats, weigh $120\pm 5g$ which obtained from Research Institute Ophthalmology Medical Analysis Department, were used in this study. Rats were in cages under the normal laboratory condition and were fed on standard diet for a week as an adaptation period. Diet was offered to rats in special feed cups to avoid loser conditions of feed, water was provided to the rats by glass tubes supported to one side of the cage, food and water provided ad-labium and checked daily.

Experimental design

Fourty Two(42) male albino rats, Sprague Dawley Strain, weight $120 \pm 5g$.The animals were classified in to 6 groups it consists of seven rats. Experimental was applied in laboratory of the Faculty of Home

Economics ,Menoufia University. Rats were kept in cages wire. The diet was introduced in special feed cups to avoid scattering of feed also water was provided to the rats by glass tube through the wire case. The powder of whey protein, soy protein and beef protein were used in its basic form at the level 10% by replacing of starch calorie. All groups of rats were fed on the experimental diet for 28 days according to the following groups:

Group (1):Control negative group (C-ve) ,in which normal rats were fed on basal diet during experimental period for 4weeks.

Group (2):Rats were fed on basal diet and 10% whey protein during experimental period for 4weeks

Group (3): Rats were fed on basal diet and 10% soy protein during experimental period for 4weeks

Group (4): Rats were fed on basal diet and 10% Beef protein during experimental period for 4weeks

Group (5): Rats were fed on basal diet and 10% prepared protein from (whey+ soy +Beef protein)during experimental period for 4weeks.

Group (6): Rats were fed on basal diet and product made of oat consist of (Oat +Honey+ Cocoa+ Almond Flour).during experimental period for 4weeks.

1. Biological Evaluation:

Determination of Body Weight Gain (BWG), Feed Intake and Feed Efficiency Ratio (FER) and Relative Organs weight according to(*Chapman, et al.,1959*).

Enzymatic Colorimetric method used to determined, Serum Glucose Blood according to (*Trinder,1969*)

Enzymatic Colorimetric determination of Triglycerides was carried out according to(*Fassati and Prencipe,1982*).

Total Cholesterol was determined according to(*Allain,1974*).High Density Lipoprotein (HDL-c) was determined according to the methods described by(*Allain,1974*).

Low Density Lipoprotein (LDL-c) and Very Low Density Lipoprotein (VLDL-c) were determined by the methods of (*Lee and Nieman,1996*).

Urea was determined according to the enzymatic method of (*Schultz,1984*).

Uric Acid was determined by enzymatic colorimetric test using kits according to (*Fossati and Prencipe,1982*).

Determination of GPT was carried out according to the method of (*Tietz,1976*)

Determination of GOT was carried out according to the method of(*Henry,1974*)respectively.

3. Laboratory Analysis of Blood

Included WBC count, Hb, RBC count, Platelet count (PLC), The results of CBC are generated by highly automated electronic and pneumatic multichannel analyzers based on aperture–impedances and/or laser beam cell sizing and counting according to (Schermer, 1967).

4. Histopathological assessment

Small specimens from Liver, Kidney, Pancrease and Brain were taken from each experimental group, fixed in neutral buffered formalin, dehydrated in ascending concentration of ethanol (70, 80 and 90%), cleared in zylene and embedded in paraffin. Sections of 4–6 μm thickness were prepared and stained with hematoxylin and eosin according to (Bancroft et al., 1996) for histopathological examination

5. Statistical Analysis:

Statistical analysis is carried out according to (SAS Institute, 1988). All result were expressed as the mean \pm SD. Statistical analyses was preformed with statistical package for social science for windows (spss, version 11.0 Chicago, DL-USA)

6. RESULTS and Discussion

1. Effect of Concentrated protein sources on Body Weight Gain (BWG), Feed Intake (FI) and Feed Efficiency Ratio (FER) for four weeks :-

Data presented in Table(1) showed the effect of concentrated protein sources on Body Weight Gain (BWG%) for 4 weeks, feeding whey protein, soy protein and beef protein led to significant decrease in feed intake, a significant increase in feed efficiency ratio when compared to control group, while feeding whey protein and beef protein led to significant increase in body weight gain compared to the control group and the others.

The effect of feeding different protein sources in rats on feed intake, FER and BWG are shown in table(1). Regarding the feed intake, the control negative group showed a level of 7 ± 0.99 g/day which was significantly higher than all other groups and was nonsignificantly with group fed on 10 % beef protein (G4). Groups 2, 3 and 6 are not statistically different and the same time these groups were significantly lower than control group.

For Feed Efficiency Ratio (FER), Data given in Table (1) Showed the control negative group showed a level of 0.09 ± 0.02 which was significantly lower than all other groups 2, 3, 4 and 5 which were not significantly different from each other. These results come in parallel to that of BWG%.

Table (1): Effect of Concentrated protein sources on Body Weight Gain (BWG), Feed Intake (FI) and Feed Efficiency Ratio (FER) for four weeks

Animal groups	BWG (g/28d) Mean±SD	FI(g/day) Mean±SD	FER Mean±SD
Control group (G1)	35.92 ± 3.8 ^c	13.07±0.99 ^a	0.09±0.02 ^b
Rats fed on 10% whey protein (G2)	43.09 ± 0.23 ^b	11.16± 1.03 ^b	0.14±0.05 ^a
Rats fed on 10% soy protein (G3)	40.78 ± 1.34 ^b	11.85 ± 0.97 ^b	0.12±0.03 ^a
Rats fed on 10 % beef protein (G4)	47.35 ± 1.67 ^a	12.04±0.51 ^a	0.14±0.005 ^a
Rats fed on 10 % tested protein diet (G5)	41.08 ± 0.14 ^b	11.05 ± 0.07 ^b	0.13±0.002 ^a
Rats fed on Oat Chocolate (G6)	43.08 ± 0.15 ^b	12.05 ± 0.06 ^b	0.12±0.002 ^a
LSD	3.06	1.02	0.02

2. Effect of Concentrated protein sources on Serum Glucose Levels for four weeks (mg/dl) :

Results of Table (2) showed effect of concentrated protein sources for four weeks on Serum Glucose. It is evidence that the level of the control negative group showed a level of 139.95±6.11 which was significantly higher than the other groups. Groups 3 was statistically lower than both groups 2, 4 and 5,6. There is no significant differences between groups 2 and 5,6. Also, the same result was between groups 3 and 4.

Table (2): Effect of Concentrated protein sources on Serum Glucose Levels for four weeks(mg/dl) .

Animal groups	Glucose (mg/dl) Mean ± SD
Control group (G1)	139.95±6.11 ^a
Rats fed on 10% whey protein (G2)	125.08±4.21 ^b
Rats fed on 10% soy protein (G3)	117.40±4.09 ^c
Rats fed on 10 % beef protein (G4)	120.72±5.85 ^c
Rats fed on 10 % tested protein diet (G5)	129.32±8.85 ^b
Rats fed on Oat chocolate (G6)	138.32±8.85 ^b
LSD	3.94

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at (p≤0.05)

3. Effect of Concentrated Protein sources on Lipid Fractions for four weeks (mg/dl):

The effect of protein sources protein levels on HDL-c was tabulated in Table(3). Regarding HDL-c level, the control negative group showed the highest level of all with a value of 60.58± 6.02 mg/dl followed by group 5,2 then 4 in descending order from higher to lower. There is no significant differences between the control group and group 5 and also the same effect was detected between groups 2 and 4,6.

The effect of protein sources protein levels on LDL-c was tabulated in Table(3).For the LDL-c level, the control negative showed a level of 14.90 ± 2.74 mg/dl which was the lowest value when compared to the others. It could be noticed that groups 5 with a value of 55.39 ± 5.66 which was lower than the other tested groups fed on protein sources but washigher than control group. Groups 2 ,6 and 4 have no significant changes between each other and also there is no significant changes between groups 3 and 5.

The effect of protein sourcesprotein levels on VLDL-c was tabulated in Table(3).In case of VLDL-c levels , the control negative group was significantly lower than the other groups . There is no significant differences between groups 2 and 4 . Groups 3 and 5 showed non significant with the control group.

The effect of protein sourcesprotein levels on LDL-c/HDL-cwas tabulated in Table(3).For the LDL-c/HDL-c ratio , the value of the control group equaled 0.25 ± 0.04 which came lower than all other groups. . All other groups were higher than the control group , there is no significant changes amongall tested groups. The highest ratio was for group 3 which fed on soy protein .The results showed that feeding whey protein , soy protein and beef protein led to significant decrease in serum HDL and a significant increase in serum VLDL and LDL/HDL ratio when compared to control group.

High-protein foods with fats. These fats are harmful and can raise cholesterol levels and raise bad LDL cholesterol, but also lower good HDL cholesterol, thus increasing the risk for heart disease(*Piatti,2013*).

Table (3): Effect of concentrated protein sources onLipid Fractions for four weeks (mg/dl).

Animal groups	Lipid fractions			
	HDL-C Mean \pm SD	LDL-C Mean \pm SD	VLDL-C Mean \pm SD	LDL- C/HDL-C Mean \pm SD
Control group (G1)	60.58 \pm 6.02 ^a	14.90 \pm 2.74 ^d	13.88 \pm 2.09 ^b	0.25 \pm 0.04 ^b
Rats fed on 10% whey protein (G2)	50.05 \pm 5.18 ^b	63.32 \pm 5.19 ^a	18.26 \pm 1.16 ^a	1.3 \pm 0.57 ^a
Rats fed on 10% soy protein (G3)	43.38 \pm 4.06 ^c	60.21 \pm 3.48 ^b	14.18 \pm 1.04 ^b	1.39 \pm 0.42 ^a
Rats fed on 10 % beef protein (G4)	49.55 \pm 4.64 ^b	65.78 \pm 3.71 ^a	20.68 \pm 1.76 ^a	1.33 \pm 0.93 ^a
Rats fed on 10 % tested protein diet (G5)	56.64 \pm 7.98 ^a	55.39 \pm 5.66 ^b	15.08 \pm 1.36 ^b	0.98 \pm 0.07 ^a
Rats fed on Oat chocolate (G ^٦)	57.64 \pm 7.88 ^a	56.39 \pm 5.63 ^b	16.08 \pm 1.34 ^b	0.96 \pm 0.07 ^a
LSD	4.96	4.07	2.98	0.53

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at (p<0.05)

4.Effect of concentrated protein sources onCholesterol and Triglycerides for four weeks (mg/dl) :

The Effect of concentrated protein sources on total cholesterol presented in Table (4).The control group showed a level of 89.36± 4.25mg/dl which is statistically significantly lower than all other groups . All groups were significantly different when compared to the control group. There is no significant between groups 2 and 4,5.

The Effect of concentrated protein sources on Triglyceride levels presented in Table (4).showed thatReduced dietary protein intake from 25% to 10% over a period of 4 d was associated with 14% increased energy intake (p = 0.02) as previously reported, and a 6-fold increase in fasting circulating plasma FGF-21 levels (p<0.0001), a 1.5-fold increase in serum triglycerides (p<0.0001), and a 0.9-fold decrease in serum.

Table(4): Effect of cincentratedprotein sources onCholesterol and Triglycerides for four weeks (mg/dl) .

Animal groups	Lipid profile (mg/dl)	
	Total cholesterol Mean ± SD	Triglyceride Mean ± SD
Control group (G1)	89.36±4.25 ^d	69.40±5.96 ^c
Rats fed on 10% whey protein (G2)	131.63±8.02 ^a	91.30±7.44 ^b
Rats fed on 10% soy protein (G3)	117.77±6.1 ^c	70.90±4.92 ^c
Rats fed on 10 % beef protein (G4)	136.01±9.52 ^a	103.40±6.14 ^a
Rats fed on 10 % tested protein diet (G5)	127.11±7.56 ^b	75.40±3.02 ^c
Rats fed on Oat chocolate (G6)	135.10±7.56 ^b	76.40±3.02 ^c
LSD	5.77	6.98

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at (p<0.05)

5.Effect of Concentrated protein sources on Blood Components for four weeks:

Data showed in Table(5).Effect of Concentrated protein sources protein sources onHemoglobin for four weeks .The control group showed a level of 13.1±1 .17 g/dl for hemoglobin , there is no significant differences among all tested groups.

Data showed in Table(5) Effect of Concentrated protein sources protein sources onRed Blood Cellsfor four weeks .The control group showed a level of 13.1±1 .17 g/dl for hemoglobin , there is no significant differences among all tested groups.

Regarding the red blood cells(RBC) $\times 10^6$, the control group showed a level of 5.08 ± 0.71 but the differences between the control group and the others are nonsignificant.

Data showed in Table(5).Effect of Concentrated protein sources protein sources onshowed that The platelets (Plat. $\times 10^3$) of the control group showed alevel of 205.31 ± 6.75 which was significantly differed form group 3 that gained 207.8 ± 7.3 however, group 4 was significantly higher than the other groups.

Data showed in Table(5).Effect of Concentrated protein sources protein sources onLymphocyte showed that For the lymphocytes (%), the mean value of control group was 38.3 ± 2.08 which was significantly differed form group 2 and 4 that. The highest value was in the forth group followed by the group fed on 10% whey protein and the lowest one was group 3 which didn't significantly differ from the control group and group 5,6.

Data showed in Table(5).Effect of Concentrated protein sources protein sources onHematocrit showed that Regarding the hematocrit(%) levels, the control group showed a level of 37.1 ± 4.3 . There is no significant between the control group and group 5. While groups 2,3 and 4 showed nonsignificant differences among each other.

Table(5): Effect of Concentrated protein sources on Blood Components for four weeks.

Animal Groups	Hemoglobin (g/dl) Mean \pm SD	Red Blood Cells (RBC) $\times 10^6$ Mean \pm SD	Platelet $\times 10^3$ Mean \pm SD	Lymphocytes % Mean \pm SD	Hematocrit% Mean \pm SD
Control group (G1)	13.1 ± 1.17^a	5.08 ± 0.71^a	205.31 ± 6.75^c	38.3 ± 2.08^b	37.1 ± 2.3^a
Rats fed on 10% whey protein (G2)	12.9 ± 1.22^a	4.76 ± 0.75^a	240.99 ± 9.09^a	44.7 ± 3.18^a	32.7 ± 2.35^b
Rats fed on 10% soy protein (G3)	12.3 ± 1.37^a	4.65 ± 0.47^a	207.8 ± 7.3^c	37.7 ± 2.53^b	30.3 ± 4.52^b
Rats fed on 10 % beef protein (G4)	12.7 ± 1.02^a	4.72 ± 0.63^a	250.7 ± 8.7^a	47.3 ± 5.33^a	31.8 ± 3.11^b
Rats fed on 10 % tested protein diet (G5)	13.2 ± 1.92^a	5.06 ± 0.63^a	220.65 ± 8.7^b	41.3 ± 5.33^b	37.8 ± 5.67^a
Rats fed on Oat chocolate diet (G6)	12.9 ± 1.92^a	5.01 ± 0.63^a	210.65 ± 8.7^b	40.3 ± 5.33^b	34.8 ± 5.67^a
LSD	1.23	0.98	10.98	3.84	3.99

Values are mean \pm SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p < 0.05$)

6.Effect of concentrated protein sources onKidney Functions for four weeks (mg/dl) :

The effect of concentrated protein sources on Uric acid was found in table(4).The level of uric acid was 0.95 ± 0.01 mg/dl which lower than all other groups. There is no significant differences among group 2, 4 and 5,6while control group and group 3showed no significant between each other . The highest value was recorded in group 4 .

The effect of concentrated protein sources on Urea Levels was found in table(4).For the level of urea nitrogen, the control negative group showed significant difference with the other groups. There is no significant between groups 2 and 5,6. The highest value was recorded in group fed on 10% beef protein.

The results showed that feeding whey portion and meat protein significantly increased uric acid and urea nitrogen level which indicates worsening of kidney functions as compared to the control group

Table (6):Effect of concentrated protein sources onKidney Functionsfor four weeks (mg/dl) .

Kidney function	Uric acid	Urea
Animal Groups	Mean \pm SD	Mean \pm SD
Control group (G1)	0.95 ± 0.01^b	14.7 ± 0.9^d
Rats fed on 10% whey protein (G2)	1.23 ± 0.11^a	27.6 ± 1.4^b
Rats fed on 10% soy protein (G3)	1.04 ± 0.09^b	20.9 ± 0.6^c
Rats fed on 10 % beef protein (G4)	1.42 ± 0.05^a	35.6 ± 1.9^a
Rats fed on 10 % tested protein diet (G5)	1.12 ± 0.66^a	25.6 ± 1.03^b
Rats fed on Oat chocolate (G6)	1.17 ± 0.66^a	30.6 ± 1.03^b
LSD	0.32	3.35

Values are mean \pm SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p \leq 0.05$)

7. Effect of concentrated protein sources onLiver Functions for four weeks (U/L):

Data presented in table(7)showed the effect of concentrated protein sources on liver functions. For AST level , the control negative group showed the lowest value which was 30.06 ± 1.07 U/L. The highest AST level occurred in group (4) with a value of 57.52 ± 7.22 U/L . There is no significant between G2,G6 and G5. The other groups were significantly different from each other .

Data presented in table(7)showed Concerning of ALT level, the control negative group showed a level of 29.51 ± 3.94 U/L which is significantly lower than all other groups followed by group (3) with a

value of 40.29 ± 5.26 U/L and group (5) which showed a value of 41.52 ± 3.11 . The highest value was observed in group (4) with a value of 65.93 ± 6.25 U/L . All groups are statistically significantly different except groups 3 and 5 which recorded no significant changes between each other.

Data presented in table(7) showed Regarding ALP level, there is no significant among groups 2,4 and 5. Also, the group 3 and the control group showed no significant between each other. The highest value was recorded for group 4. The results show that feeding whey protein , soy protein and beef protein led to significant increase in AST and ALT levels which indicated a deterioration in liver functions in comparison to control group except AIP level .

Table(7): Effect of concentrated protein sources on Liver Functions for four weeks (U/L).

groups	Liver functions (U/L)		
	AST Mean \pm SD	ALT Mean \pm SD	ALP Mean \pm SD
Control group (G1)	30.06 \pm 1.07 ^d	29.51 \pm 3.94 ^d	19.3 \pm 1.32 ^b
Rats fed on 10% whey protein (G2)	44.87 \pm 4.42 ^b	51.79 \pm 6.28 ^b	28.73 \pm 10.06 ^a
Rats fed on 10% soy protein (G3)	38.66 \pm 5.76 ^c	40.29 \pm 5.26 ^c	20.24 \pm 5.13 ^b
Rats fed on 10 % beef protein (G4)	57.52 \pm 7.22 ^a	65.93 \pm 6.25 ^a	32.23 \pm 9.5 ^a
Rats fed on 10 % tested protein diet (G5)	41.52 \pm 3.11 ^b	42.93 \pm 1.05 ^c	29.23 \pm 2.15 ^a
Rats fed on Oat chocolate (G6)	43.52 \pm 3.11 ^b	41.92 \pm 1.05 ^c	30.21 \pm 2.15 ^a
LSD	4.01	3.07	3.53

Values are mean \pm SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p \leq 0.05$)

8. Effect of Concentrated Protein on Histopathology Organs Tissues of Albino Rats for four weeks :

Small specimens from Liver, Kidney, Pancrease and Brain were taken from each experimental group. Results of histopathological examinations showed that :-

By Histological Examination of the liver tissues of the control group, it showed normal central vein results(Photo.1). The second group fed on whey protein showed congestion in the cells of the hepatic central vein, interstitial degenerations, and severe activation of Kupffer cells(Photo.2) . The third group fed on soybean protein showed widening of the hepatic sinuses(Photo3) , and the fourth group that Feeding on

meat protein, it showed scattered necrosis in the hepatocytes, granulomatous and vacuolar degenerations, and congestion in the central veins with a severe fibrous circumference(Photo.4).

As for the fifth group that was fed a mixture of both, showed liver cells close to the normal appearance with a slight expansion of the hepatic sinuses(Photo.5), while the sixth group that was fed the basic food added to it oat balls showed the best restoration of the liver tissue that resembles the normal appearance of the liver(Photo.6).

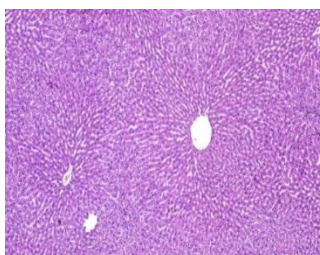


Photo.(1): Liver sections of control group (H&E X100).

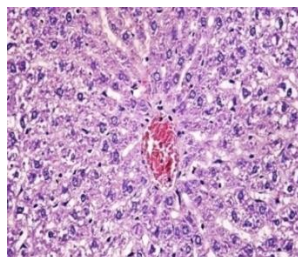


Photo.(2): Liver sections of Rats fed on Whey protein (Type 1) for four weeks (H&EX100).

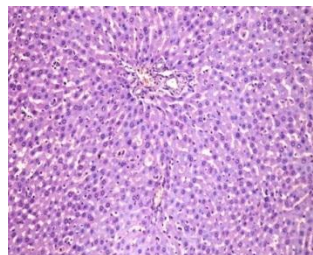


Photo.(3): Liver sections of Rats fed on Soy protein (Type 2) for four weeks (H&E X200).

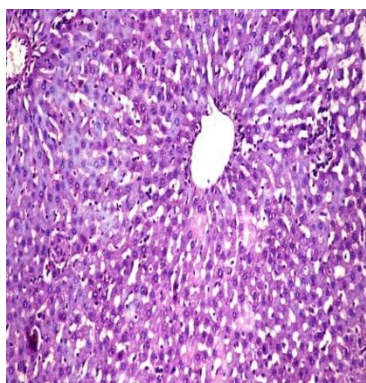


Photo.(4): Liver sections of Rats fed on Beef protein (Type 3) for four weeks(H&E X200).

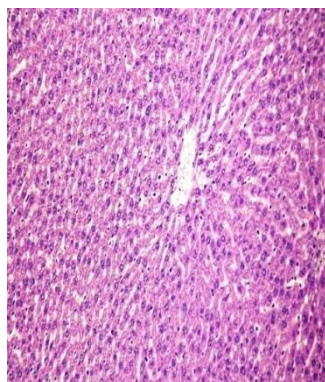


Photo.(5): Liver sections of Rats fed on(Type 1+2+3)for four weeks (H&E X400).

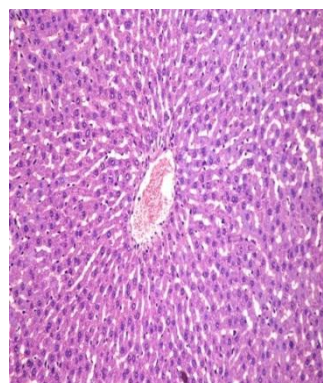


Photo.(6): Liver sections of Rats fed on(Oat chocolate)for four weeks (H&E X100).

By Histological Examination of the Kidney tissues showed that the kidneys of the control group showed normal results for the renal glomeruli and the renal tubules branching from them(Photo.7). The second group fed on whey protein showed diffuse swelling with granules in the outer lining of the renal tubules(Photo.8). The third group fed soybean protein showed mild necrotic changes in the tube. Kidneys and spaces for some cells(Photo.9).

As for the fourth group that was fed on meat protein, it showed severe congestion and scattered necrosis and scaly in the outer cells of the renal tubules(Photo.10), while in the fifth group that was fed a mixture of both of them, it showed congestion of the glomerular capillaries and deteriorating scattering and necrosis in the outer lining of the kidney(Photo.11), while the sixth group that was fed the basic food added to it Oat balls showed good protection of renal cells in the outer lining of the kidney(Photo.12).

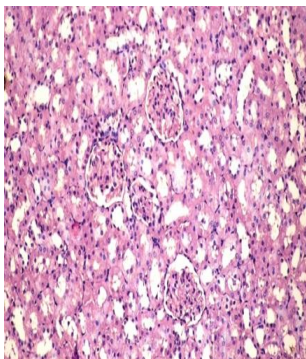


Photo.(7): Kidney sections of control group (H&E X100).

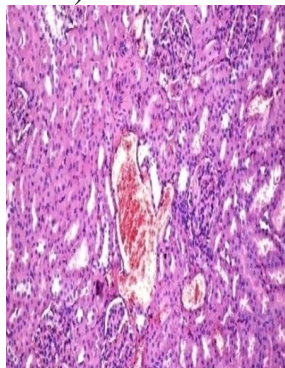


Photo.(8): kidney sections of Rats fed on Whey protein (Type1) for four weeks (H&E X100).

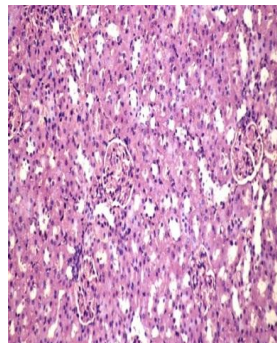


Photo.(9): Kidney sections of Rats fed on Soy protein(Type2) for four weeks(H&E X 100& 400,respectively).

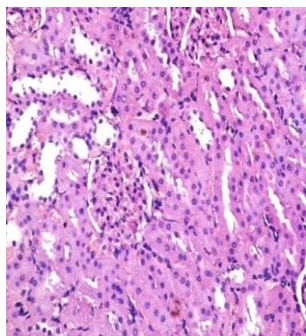


Photo.(10): Kidney sections of Rats fed on Beef protein(Type 3)for four weeks(H&E X 100& 400,respectively).

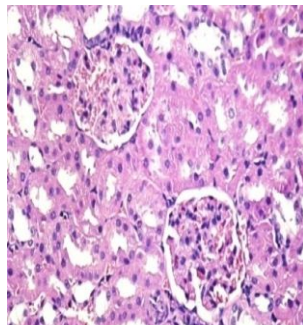


Photo.(11): Kidney sections of rats fed on (Type 1+2+3) for four weeks(H&E X 100).

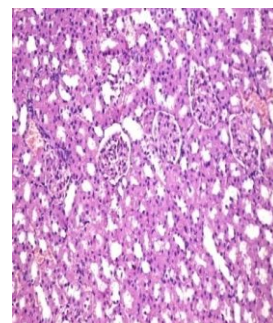
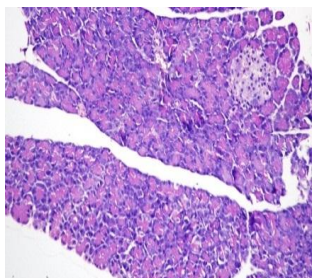


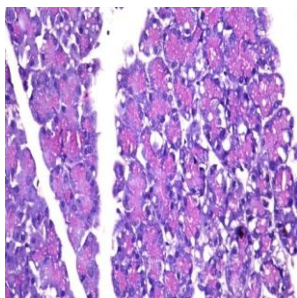
Photo.(12): Kidney sections of rats fed on (Oat chocolate) for four weeks (H&E X 400)

By Histological Examination of the Pancreatic tissue showed that normal results for islet cells of Langerhans and acinar cells(Photo.13), the second group fed on whey protein showed necrosis in the outer lining of a few pancreatic cells(Photo.14), and the third group fed on soybean protein showed good histological recovery of pancreatic cells(Photo.15).As for the fourth group that was fed on meat protein, it showed voids and hives in the pancreatic vessels, the presence of few

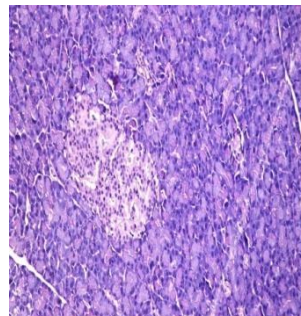
necrosis, and the presence of scattered degenerations with necrosis in the vicinity of the small pancreatic resections(Photo.16). While the sixth group showed a normal histological appearance of pancreatic islet cells(Photo.17).



Photo(13): pancreas sections of control group (H&E X400).



Photo(14): pancreas sections of rats fed on Whey protein (Type1) (H&E X 400).



Photo(15): pancreas sections of Rats fed on Soy protein (Type 2)(H&E X& 400).

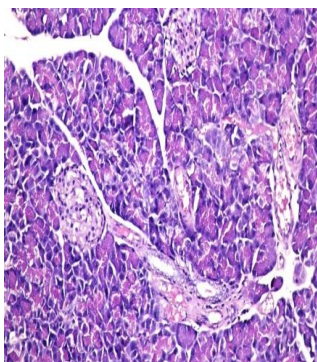


Photo.(16): pancreas sections of Rats fed on Beef protein (Type 3) for four weeks(H&E X& 400).

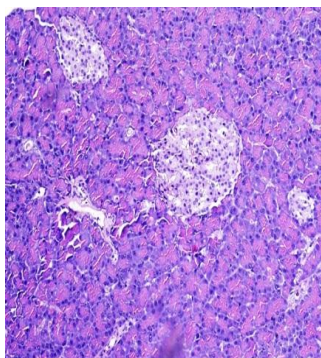


Photo.(17):Pancreas sections of Rats fed on (Type 1+2+3) for four weeks(H&E X& 400).

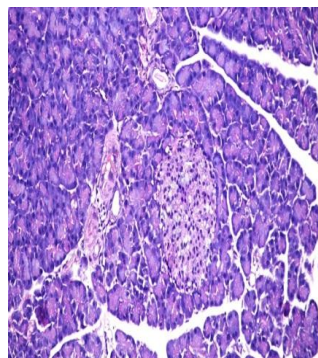


Photo.(18):Pancreas sections of Rats fed on (Oat chocolate) for four weeks(H&E X& 400).

By Histological Examination of the Brain tissue showed that The brain tissues of the control group showed normal results for cerebral cortical neurons(Photo.19), the second group fed on whey showed wide spread of neural gaps and good organization of the cerebral neural layers and shrinkage of dark neurons(Photo.20), while in the third group fed soybean showed the presence of scattered necrosis spaced in the neurons(Photo.21). As for the fourth group that was fed meat protein, it showed severe necrotic changes in brain neurons and a few dead neurons(Photo.22), and in the fifth group that was fed a mixture of both, it showed little edema around the blood vessels and necrotic changes of brain cells(Photo.23), while the sixth group that was fed the basic food added Oatmeal balls are a natural manifestation of the tissue layers of the nerve cells in the brain(Photo.24).

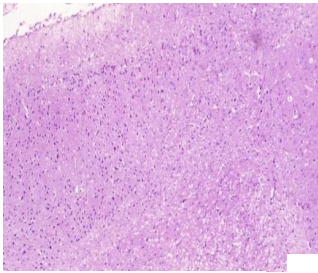


Photo.(19): Brain sections of control Rats group (H&E X& 400).

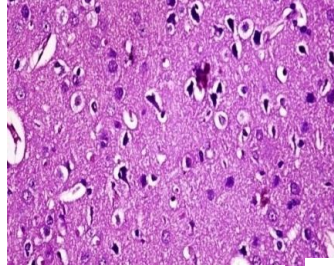


Photo.(20):Brain sections of Rats fed on Whey protein (Type 1)(H&E X& 400).

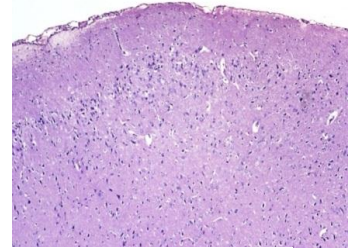


Photo.(21):Brain sections of Rats fed on Soy protein (Type2) (H&E X& 400).

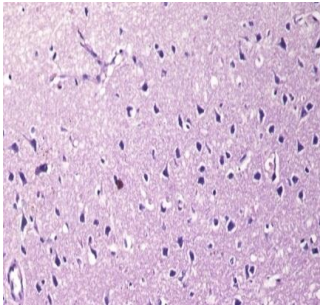


Photo.(22): Brain sections of Rats fed on Beef protein (Type3) for four weeks (H&E X& 400).

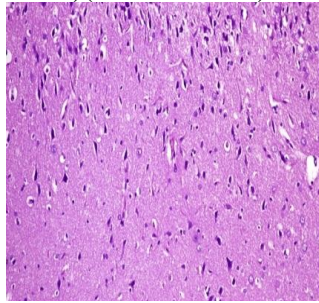


Photo.(23): Brain sections of Rats fed on (Type1+2+3) for four weeks (H&E X& 400).

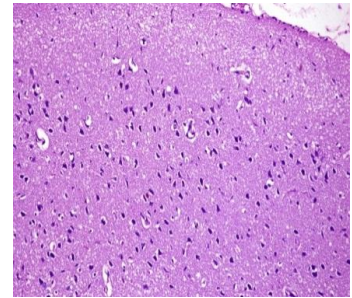


Photo.(24): Brain sections of Rats fed on (Oat chocolate) for four weeks (H&E X& 400).

REFERENCES

- Allain, C.C. and Poon I. S.(1974):**Enzymatic determination of total serum cholesterol Clin. Chem.,20:470-475.1
- Aymerich, T.; Picouet, P.A. and Monfort, J.M. (2008):** Decontamination technologies for meat products. Meat Science,78(1–2): 114-129.
- Bancroft,D.;Steven,A.;and Turner,R.(1996):**Theory and Practise of Histological Techniques,Churchill Livingstone,Edinburg, London, Melbourne.
- Bounous,G.(2000):**Whey protein concentrate (WPC) and glutathione modulation in cancer treatment. Anticancer.Res.,20:4785-4792.
- Chapman,D.G.;Castilla,R.and Campbell, J.A. (1959):** Evaluation of protein in food.I:A method for the determination of protein efficiency ratio. Can .J. Biochem. Physiol.,37:679-686.
- Fossati, P. and Prencipe, L. (1982):** Determination of Serum Uric acid. J. of Clin. Chem., 28:2077.
- Henry,R.J.(1974):**Clinical Chemist :Principles and Technics, Hagerstown (MD), Harcer,Row,P.82.
- Hoffman, J. R. and Falvo ,M. J. (2004):**"Protein –Which is best?". Journal of Sports Science and Medicine, (3): 118–130.
- Huang,W.C;Chang, Y. C; Chen,Y. M; Hsu, Y. J; Huang, C. C; Kan, N. W and Chen,S.S.(2017):** Whey Protein Improves Marathon-Induced Injury and Exercise Performance in Elite Track Runners.Int.J. Med. Sci. 14(7): 648-654.
- Lee,R.D.and Nieman,D.C.(1996):**Nutritional Assessment, Mosby, Missoun, USA.
- Nuutila,A.M and Carlson,A.R.(2000):**Transgenic oat plants via visual selection of cells expressing green fluorescent protein.plant cell Rep-19.661:666.
- SASInstitute,(1988):**SAS/STAT users guide,release 6.03.Cary,North Carolina : SAS Institute.
- Schermer,S.(1967):**The Blood Morphology of Laboratory Animal. Longmans, Printed in Great Britain,Green and Co.L.T.d.,350.
- Schultz, A. (1984):** Determination of Serum Urea Nitrogen, ClinChemThe C.V. Mosby Co. St Louis Toronto. Princeton;1261-1266 and 231.
- Trinder,P.(1969):**Determination of blood glucose in blood using glucose oxidase with an alternative oxygen acceptor,Annals of Clinical Biochemistry,6:24:25.
- Valentine,J,C.(2004):** New directions in breeding for high quality oats,pp. 45: 50.
- Willim,S. (2008):** Akiko Aoyagi History of Cooperative Soybean Processing in the United States: Extensively Annotated Bibliography and Source book Soyinfo Center

التأثير البيولوجي لبعض مركبات البروتين المتاحة في الأسواق المحلية علي الحالة الصحية للفئران.

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الملخص العربي:

يعتبر البروتين هو العنصر الغذائي الرئيسي الذى يحتوى على الأحماض الأمينية الهامة واللازمة في تركيب عضلات الانسان وإصلاح الانسجة العضلية، وقد استخدمت في هذه الدراسة ثلاثة أنواع من مركبات البروتين وهما (بروتين شرش اللبن - بروتين فول الصويا - بروتين اللحم) بجانب المنتج المحتوى في تركيبه على نسبة من الشوفان لدراسة تأثير تلك مركبات البروتين على الحالة الصحية العامة للفئران السليمة . استخدم اثنان واربعون فأرا البينو ذكور بالغين يتراوح متوسط وزن الفأر بين (١٢٠+٥ جم) وقسمت تلك الفئران الى ستة مجموعات تحتوى كل مجموعة على سبعة فئران، وتم تغذية المجموعات جميعا على الوجبة القياسية لمدة أسبوع لاحداث التكيف، واستخدمت مجموعة منهم كضابطة سالبة تتغذى على الغذاء الأساسى وتم تغذية المجموعة الثانية على (الغذاء الاساسى + ١٠% من بروتين شرش اللبن) وتم تغذية المجموعة الثالثة على (الغذاء الاساسى + ١٠% من بروتين فول الصويا) وتم تغذية المجموعة الرابعة على (الغذاء الاساسى + ١٠% من بروتين اللحم) وتم تغذية المجموعة الخامسة على (الغذاء الاساسى + نسب من كل من بروتين شرش اللبن وفول الصويا وبروتين اللحم) وتم تغذية المجموعة السادسة على (الغذاء الاساسى + كرات من شيكولاته الشوفان بالعسل واللوز) واستغرقت التجربة أربعة أسابيع.

ويعد انتهاء التجربة تم ذبح الفئران وتجميع عينات الدم واستخراج الكبد والقلب والكلى وبقية الأعضاء الداخلية ووزنهم كل فأر على حدة وذلك لدراسة تأثير مركبات البروتين على الوزن المكتسب، معدل الاستفادة من الطعام، وظائف الكبد ووظائف الكلى، سكر الدم، ومستويات الدهون في الدم، صورة الدم الكاملة وكذلك التغيرات الهستوباثولوجية لكل من الكبد والكلى والبنكرياس والمخ ...

وتوصلت الدراسة إلى مجموعة من النتائج أهمها أن تلك الأنواع من مركبات البروتين محور الدراسة اثرت بشكل كبير على الحالة الصحية للفئران المختبرة من خلال زيادة الكتلة العضلية وارتفاع مستوى الهرمونات الذكورية الا انها تسبب عند الاستهلاك لفترة طويلة العديد من الامراض كالسكري وارتفاع ضغط الدم ومن ثم توصى الدارسة بزيادة الوعي حول فوائد ومخاطر مركبات البروتين عند تناولها من قبل الافراد.

الكلمات الافتتاحية: مركبات البروتين (بروتين شرش اللبن، بروتين فول الصويا، بروتين اللحم).