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Effect of diets containing evening primrose flower brown algae and nabka plant parts on obese male albino rats

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1-Abstrac

This work aimed to evaluate the possible slimming action of nabk(fruit, leaves & seeds) (*Ziziphusjujuba),*the brown algaeseaweed (*Saragassumfilipendula*) and evening primrose flower (*Oentheraspeiose*) at 3 & 5% levels and their mix in obese rat diet as well as their mixture prepared of equal powder proportions . A total number of 56 male albino Sprague Dawley rats were divided into 14 groups (4rats each) . Obesity in rat induced by feeding on high fat diet.Basal diets containing 3% or 5%ofsuggested sliming plants fed to obese rats for 28 days . Biochemical analyses included phenol, and flavonoid compounds of plants and serum glucose were determined. Liver function parameters (GOT, GPT ,ALP) , renal function (urea, creatinine& uric acid levels Lipids profile (TC , TG , VLDL , HDL, LDL atherogenic index " AI") were estimated Histopathological changes of heart , liver & kidney also were examined in the scope of this study. Thebest result was that of the nabk leaves followed by brown algae diets , especially at 5% as compared to 3% level .

Keywords :High fat dietdietNabak (fruit, leaves & seeds)brown algae , evening primrose, Obese

2-Introduction

Obesity is an extremely significant and increasing public health challenge in both economically developed and developing regions of the world. In 2008, more than 1.4 billion adults, worldwide, were overweight and of these more than 200 million men and nearly 300 million women were obese, a number that has doubled since the 1980 . The current estimates are that 33 % of the world's population of 7.08 billion—a --staggering 2.36 billion people—are overweight or obese . There are an estimated 2.5 people added to the global population each second and one of them will be obese or overweight. It is estimated that 35.7 % of the adult population in the United States is obese. **(Armour*et al* ., 2020)**.

Epidemiology Of Overweight and Obesity In the United States (US), data from the National Health and Nutrition Examination Survey using measured heights and weights shows that the steady increase in the prevalence of obesity in both children and adults over the past several decades has not waned, although there seaweed generally refers to plants and algae that grow in waterways such as oceans, lakesare exceptions among subpopulations. In the most recently published US report (2015-2016), 39.8% of adults (BMI ≥ 30 kg/m2) and 18.5% of youth (BMI ≥ 95 th percentile of age- and sex-specific growth charts) are obese **(Bhupathiraju and Fran , 2018)**

Nabk (*Zizyphusspina Christi*),

Sidr or Nabka in Arabic is a tree belonging to the genus(*Zizyphus in Rhamnaceae*)family It has been used in folk medicine as demulcent, emollient, and as a mouth wash . The plant has been reported to possess antioxidant, antibacterial, antifungal, antidiabetic, and analgesic effects . Antioxidant activity and the presence of flavonoids make the plant possible to have anticancer activity. Furthermore, a study done on 2015 approved that methanol of(*(Zizyphusspinachristi*)had a potent anti-angiogenic activity .**(Ahmed *et al.*, 2017)** . The effect of nabk on obesity is still unclear .

Therapeutic Effect of brown seaweed derived Carotenoid on Obesity Management . Obesity- defined as the excessive or abnormal accumulation of body fat in the adipose tissue, energy imbalance, and lipogenesis—results from modern lifestyles characterized by high intakes of fat, sugar, and calories, in addition to poor exercise and

physical activity . It is a global epidemic with over 2.1 billion cases, accounting and has been projected to rise drastically, especially in the adult population, in the near future .The societal impact of obesity has been categorized to include huge personal, social, and economic costs obese .It seem**s** that xanthophyll carotenoid of seaweed may control obesity **(Oyindamola*et al* ., (2020)**

It was demonstrated that seaweeds are an excellent source of components with biological activity such as, antioxidants, polysaccharides with antiviral action and w-3 fatty acids with beneficial effects against coronary diseases . Among them, antioxidants have attracted the attention of the scientific community due to the positive effects against serious disorders. The compounds responsible of the antioxidant activity in microalgae include carotenoids, vitamin E or a-tocopherol and chlorophylls and its derivatives within the lipidic fraction and polyphenols, vitamin C or ascorbic acid and phycobiliproteins**(Rodrı´guez*et al* ., 2010) .**

There is evidence that the triacylglycerol structure of evening primrose ,especially the proportions of specific molecular species may be important. In addition, many minor lipid components may be present in the oil, e.g. sterols and tocopherols, that may have an influence on quality affecting weight management . **(William *et al* .,1999).**

This work was done to evaluate the effect of nabk (fruit, leaves &seeds)brown algae and evening primosa flower. On the complications induced by obesity in rats .

3- Aim of study

Thesis research aims to evaluate the slimmingeffectevening primrose flower, brown algae and nabka tree parts on biological , biochemical and histopathologicalchangeg of male albino obese rats .

4- Materials and methods

4.1.Basal Diet

The basal diet (casein – basal diet) was composed of 12.3 g casein (10% protein in diet), 10 g corn oil (10% fat) , 4g cellulose (5% fiber), mineral mixture (4%), choline chloride(0.2), methionine (0.3%) and corn starch up to 100 g according***(AIN, 1993).*Male** Sprague Dawley rats (56 rats) purchased from the Animal House Colony of Food Technology Institute, Agricultural Research Center which were 150 ± 10 g weight , about 1 & 1. 5 month in age . Rats kept in wire

cages and fed on basal diet for on week for adaptation . The basal diet as rcommended by **Reeves *etal*., (1993**) .Salt Mix . and vitamin Mix . were obtained from El- Gomhoria Campany at Cairo as preparedaccording to (**Hegested *et al* ., (1941**) and **Cempbell, (1963**) respectively .

After adaptation period 52 rats fed on high fat diet (H F D) for sex weeks ; H F D contained saturated fat (S F) to induce obesity as describel by **Min *etal* ., (2004**)

SF : saturated fat (fat of sheep tail purchased from a buchery . Control (-) ,healthy not obese rats and obese rats groups were fed suggested slimming plants .

Slimming plants mixture at equal propartions.

Suggested slimming plants Nabk plant parts were obtained from Horticultural Research

Institute . Leaves and fruits of nabk tree coltected , washed and sundried . Seeds separated from the fruit and both fruit and seeds sundried and milled separately to obtain powders . Powders of leaves furit & stone ather slimming plants were used in feeds of rats (at 3 % and 5% leaves) . Scientific names of used plants are as follows:

Experimental part conducted in the Food Technology Institute, Agricultura Researsh Center, Cairo , Giza , Egypt . Feeding trial laste for 28 days

A total nomber of 14 groups (4 rats each) fed as the following

Group (1) : Normal rats fed on basal diet (control ("-") .

Group (2) :Obese rats fed on basal diet only (control ("+ ") .

Group (3) :Obese rats fed on 3% nabk fruit diet .

Group (4) :Obese rats fed on 5% nabk fruit diet.

Group (5) :Obese rats fed on 3% nabk leaves diet .

Group (6) :Obese rats fed on 5% nabk leaves diet.

Group (7) :Obese rats fed on 3% nabk seeds diet.

Group (8) :Obese rats fed on 5% nabk seeds diet.

Group (9) :Obese rats fed on 3% seaweeds diet .

Group (10):Obese rats fed on 5% seaweeds diet.

Group (11) :Obese rats fed on 3% evening primose flower diet

Group (12):Obese rats fed on 5% evenig primose flower diet

Group (13):Obese rats fed on 3% mix diet of all obese slimming plants mixture at equal propartions.

Group (14):Obese rats fed on 5% mix diet of all obase slimming plants mixture at equal propartions.

4.3.Biochmical evaluation:

4.3.1.Analytical methods

4.3.1.1.Determination of glucose :

Fasting serum glucose levels were determined according to the method described **by Trinder (1969**)

4.3.1.2.Determination of liver functions :

Determination of GPT (ALT) :

Alanine amino transferase (ALT) activity was determined colorimetricallyaccording to the method of **Bergmeyer and Harder , (1986**) .

Determination of GOT (AST) :

Aspartate amino transferase (AST)) activity was determined colorimetrically according to the method of **Bergmeyer and Harder , (1986)** .

4.3.1.3.Serum Alkaline phosphatase (ALP) :

Alkaline phosphatase was determined according to the method by (IFCC methods ,1983) . Kits were btained from Gama Trade Company , Cairo , Egypt .

4.3.1.4.Determination of Kindly functions

Determinationofcreatinine **:**

Serum creatinine in plasma was determined by kinetic method

According to **Henry (1974)**

Determinationofuric acid **:**

Uric acid was determining by enzymatic test using to kits according to **Barham and Trinder , (1972) .**

Determination of serum urea **:**

Enzymatic determination of serum urea was carried out accordingto the methodof **Patton and Coruch , (1977)**

4.3.1.5.Determination of lipid profile :

Serum total cholesterol **(T C) :**

Total cholesrterol was determined in the serum according to the method described by **Allain*et al* ., (1974)** .

Serum triglycerides (T G) :

Triglcerides were determined in the serum according to the method, described by**Fossati and Prencipe (1982**) .

Serum HDL - cholesterol :

HDL- c was determined in the serum according to the method described by

Lopes – Virella*et al* ., (1977)

Serum VLDL - cholesterol :

Serum VLDL – c was calculated to **Friedwald*et al* ., (1927)**

Using the following equation.

$$\text{VLDL – c concentration (mg / dI)} = \left[\frac{\text{triglycerids}}{5}\right].$$

Serum LDL - cholesterol :

Serum LDL - c was calculated to **Friedwald*et al* ., (1927)** .Using the following equation.

$$\text{LDL – c} = \text{TC} - [\text{vLDL} - \text{c} + \text{HDL} - \text{c}].$$

4.3.2.Technological methods :

Preparation of Burgers making :

The 100 g straight dough method was used throughout the study . The Basic formula included of meat 73% g + Fat 15% (5% nabk fruit ,nabk leaves5% seaweeds 5% nabk seeds 5% evenig primose flower)

Dice up the chilli, onion, garlic

Add the Meat, (chilli, garlic, onion, egg, and Worcester7%) sauce to a large mixing bowl and season well with salt and black pepperget your hands in the bowl and mix well squeezing the mixture between your fingers

Shallow fry the burgers in the 1 cal cooking spray

Serve with a big salad

according to **Negin Yousefi .,*et al* (2018).**

Organoleptic evaluation :

Burgers making fortified with (5% nabk fruit , nabk leaves 5% seaweeds 5% nabk seeds 5% evenig primose flower) sampels after

Cooking were subjected to organoleptic testes (by ten judges) according to **Watts *et al* ., (1989).** Judgingscale forcolour , aroma , taste , texture , and overall acceptability

Very good	8 - 9
Good	6 - 7
Fair	4 - 5
Poor	2 - 3
Very Poor	0 - 1

4.3.3.Histological examination .

Specimens from liver and kidnys and heart were taken immediately after
sacrificing rats , fixed in 10% buffered neutral formalin solution ,trimmed .Washed and
dehydrated ascending ethyl alcohol solutions cleared in xylol then embedded paraffin , sectioned at 4 - 6 mm thickness ,and stained with heamtoxylin and eosin accordingto **(Carleton ,1979)**

4.3.4.Statistical analysis :

The data were statistically analysed using a computerized Costatprogramon

Analysis of Variance (ANOVA) test was used . Valves Results are presented as mean ± S D Differences between treatments at $P \leq 0.05$ were considered significant **(Sendcor and Cochran ., 1967 & SPSS , 1998)**

5- RESULTS AND DISCUS

5.1.Biological parameter

5.1.1.Table (1)Body weight gain (BWG),Feed Intake (FI) and **Feed efficienly ratio (F E R) of obese rats as affected by feeding on diets with different plants and their Mix.**

BWG Was evidently more for control (+) rats (obese rats) in comparison with the control (-) group , which were 0.751 ± 0.009 and 0.128 ± 0. 008 (g) respectively showing – 82.96 % less level of control. slimming F E R was leavened was recorded for compared to control (+) group. Highest F E R nabk leaves followed by seaweeds treatment , specially at 5 **% FER** wasincreased ,Values were 0.537 ± 0.007 and 0.015 for contro(+) and control (-) respectively . The increase was about 36 folds . It is evident that F1 of control "+" (obese) rats was appreciably than that of the control (-) Group , being 20.31 ± o.11 & 8.6 .4 ± 0.223 g respectively .

F1 in different treatment except in there cases , which were nabk leaves (3 & 5 %), followed by seaweeds (3 & 5 %) and nabk Fruits .

5.1.2.Table (2) illustrated Total cholesterol (TC) and SerumTriglycerides (TG) obese rats as effected by feeding on diets with different Plants and their mix.

Obesity raised the TC from 73 ± 2.00 to 211 ± 2.10 mg/dI which was decreased when obese rats fed on suggestedslimming plant diets .TC specially for nabk leaves,at 5% nabk leaves diet TC (75 mg/dI) was nearly the same as for control (-) group (73 mg/dI). There was least decrease compared to the control (+) rats recorded for the mix diet. It could be noticed that due to obesity ,TG level was raised from (83 ± 2.00 to295. 7 ± 5.60 Mg/dI). TG recorded for nabk leaves diet (80 ± 2.01 mg /dI) followed by that of the brown algae diet (86 ± 2.013 mg/dI)

5.1.3.Table (3) Serum (VLDL-c) ,(HDL-c) ,(LDL-c)and Atherogenic Index(AI) obese rats as effected by feeding on diets with different Plants and their mix

VLDL level increased in serum from (16.6 ± 0.601 mg / dI to 59.14 ± 0.810 mg/dI) Least level of VLDL in serum recoded for nabk leaves diets (19.0 and16 ± 2.53 for3% and 5% nabk levels respectively). Seaweeds diet followed that of leaves ,the low VLDL in serum (19 0.8 ± 0.81 & 17.07 ± 1 .006 mg/dI) .

HDL decreased from (50 ± 1 . 021 to 25 ± 1.511 mg/dI). Lowest HDL found for rats fed on shimming plants the nabk leaves followed by brown seaweeds dietsspecially at 5% It could be observed that due to obesity. LDL Level raised from (6.4 ± 1.42 & 120.86 ± 1.22) mg/dI Percent increase was (94.96 ± 1.52) lowest LDL in serum was found for nabk leaves diets 5%(9.0 ± 1.022)mg/dI. Brown algae diet followed that of the nabk leaves diet with levels(17.8 ± 1.83 &13.2 ±.124) mg/dI for 3 & 5% adel plants respectively .AI values as calculated for normal and obese rats . By & 7.44 ± 1.14)mg/dI.obesity induction AI greatly increased from(0.46 ± 0.06

AI declined when obese rats fed on suggested slimming plants diets specially consideringthe nabk leaves diet followed by seaweed diet particularly at the higher level (5%) in comparison with that of the low level (3%)

5.1.4.Table (4) Serum glucose of obese rats as effected by feeding on diets with different Plants and their mix

Glucose from (120 ± 2.01 & 195 ± 3.01) mg/dI showingpercent decrease for control (-) compared to control (+), while lowest serum glucose recorded for 5% nabk leaves diet (90 ± 1.53) mg/dI followed by 5% seaweed diet 5% (99 ± 1.23))mg/dI , values ofnabk fruit 5%,evening primosa 5% , nabk seed 5% and Mix 5% (106 ± 1.54 , 109 ± 1.72 ,125 ± 0.81 , 132 ± 1.72) mg/dI respectively .

5.1.5.Table (5) Uric acid , creatinine, and urea **of obese rats as effected by feeding on diets with different Plants and their mix .**

Itcould be noticed that uric acid was increased from .(0.75 ± 0.02 & 1.30 ± 0.10) mg/dIIn particular maximum decrease of uric acid (- 50 .77 to – 53 .85 % decrease) compared to control (+)group, nabk leaves diet followed by (- 43.08 % to - 45.39 % decrease) that of seaweed treatment, considering the level of uric acid. Considering highest creatinine it was evident (+ 37.59%) for obese rats (control"+") compared the control (-) group . But nabk leaves 5% and seaweed 5% diet which revealed no synergistic action decreased the level for serum creatinine As result of obesity urea in serum raised from(15.11 ± 0.11 & 48.02 ± 1.00) mg/ dI showing decrease of (- 68.53 %) in control (-) compered to control (+) rats. Nevertheless feeding on diet containing urea at (– 69.41%) compared to control (+) group , seaweeds

5.1.6.Table (6)Alkaline phosphatase (ALP) , (AST) and (**ALT)of obese rats as effected by feeding on diets with different Plants and their mix .**

It is evident that due to obesity Alp activity was raised from 160 to 273 U/ L .The results of Alp activity reduced especially for the group fed on by nabk leaves followed by seaweeds diets then came nabk fruit , evening prjmose , nabk seedDue to obesity(AST)activity was raised from (18 ± 1.25 to 45 ± 1.50.In this connection least Got activity showed for nabk leaves diets followed by seaweed diet then came nabk fruit and evening primrose The(ALT) activity from (15.11 ± 1.50 to 48± 1.80) U/L which was reduced when obese ratsAlp activity reduced especially considering nabk leaves followed byby feeding seaweed diet .

Table (1): Serum (BWG ,FI , FER) and (AI) of obese rats as effected by feeding on diets with differePlants and Thais mix

parameter / Groups			BWG% (Mean±SD)	Feed Intake (Mean±SD)	FER (Mean±SD)
Controls	(-)		0.128^{K} ±0.008	8.64^{i}±0.223	0.015 ^{ef}±0.005
	(+)		0.751^{a}±0.009	20.31 ^{g} ±0.11	0.537 ^{a}± 0.007
Nabk	Fruit	3%	0.508^{g}±0.009	28.22 ^{f}±0.11	0.018 ^{e}± 0.008
		5%	0.245 ^{h}± 0.005	12.90 ^{h} ±0.10	0.019 ^{c}± 0.008
	Leaves	3%	0.179 ^{J}±0.010	7.16 ^{K}±0.06	0.025 ^{d}± 0.005
		5%	0.179 ^{J}±0.009	7.04 ^{K}±0.04	0.026 ^{d} ± .006
	Seeds	3%	0.713 ^{b}± 0.011	50.93 ^{b}±0.03	0.014 ^{g}± 0.004
		5%	0.632 ^{c}±0.0012	52.75 ^{a}±0.15	0.012 ^{K}± 0.003
Brown seaweeds		3%	0.200^{i}± 0.010	8.70 ^{i}±010	0.084 ^{K}± 0.004
		5%	0.179 j±0.009	7.41 ^{J}±0.11	0.079 ^{c} ± 0.009
Evening primrosa		3%	0.633 ^{c}±0.013	42.2 ^{c}±0.20	0.015 ^{ef}± 0.005
		5%	0.558^{e}±0.008	31.0 ^{e}±1.00	0.018 ^{e}±0.0018
Mix		3%	0.591 ^{d}±0.011	42.20 ^{c} ±0.15	0.014 ^{ef}± 0.004
		5%	0.541 ^{f}±0.010	36.06 ^{d}±0.060	0.015 ^{ef}± 0.005

Means in the same row with different letters significantly different (P⩽0.05).

Table (2): Serum Total Cholesterol and Serum Triglyceridesof obese rats as effected by feeding on diets with differe Plants and Thais mix

Parameter / Groups			TotalCholesterol Mg/dl (Mean±SD)	Serum Triglycerides Mg/dl (Mean±SD)
Controls	(-)		73 ^{m}± 2.00	83±2.00
	(+)		211 ^{a}± 2.10	295.7±56.0
Nabk	Fruit	3%	105 ^{h}± 2.02	125±2.10
		5%	94^{i}±2.03	123±2.04
	Leaves	3%	76 ^{K}± 2.02	95±2.05
		5%	75 ^{L}± 2.04	80±2.01
	Seeds	3%	130 ^{e}± 2.03	220±2.013
		5%	138 ^{d}± 2.01	211±2.04
Brown seaweeds		3%	79 ^{K}± 2.012	99±2.10
		5%	84 ^{J}± 2.01	86±2.013
Evening primrosa		3%	128 ^{f}± 2.04	145±2.50
		5%	113.3 ^{g}± 2.516	171±2.02
Mix		3%	165 ^{b}± 2.04	287±2.03
		5%	140 ^{c}±2.05	266±2.04

Means in the same row with different letters are significantly different (P⩽0.05

Table (3): SerumVLDL-c , LDL-c , HDL-c and AI **of obese rats as effected by feeding on diets with different Plants and their mix .**

parameter / Groups			Serum VLDL-c Mg/dI (Mean ± SD)	Serum LDL-c Mg/dI (Mean ± SD)	Serum HDL-c Mg/dI (Mean ± SD)	Atherogenic Index Mg/dI (Mean ± SD)
Contril	(-)		16.6 ^{K}±0.601	6.4^{I}±1.42	50 ^{a} ±1.021	0.46 ^{J} ±0.06
	(+)		65.8 ^{a}± 0.810	120.2^{a}±1.22	25^{i}±1.511	7.44^{b} ± 0.14
Nabk	Fruit	3%	25 ^{ef} ± 2.04	40^{f}±1.53	40 ^{f} ±1.83	1.63^{K}± 0.13
		5%	24.6 ^{ef}± 0.610	24.4^{h}±1.42	45 ^{e} ±2.04	1.09^{m}±0.9
	Leaves	3%	19 ^{f}± 2.03	9.0^{K}±1.032	48 ^{c} ±1.81	0.58^{N} ±0.08
		5%	28 ^{ef}± 22.53	9.0^{K}±1.022	50 ^{a} ±1.72	0.50^{O} ±0.101
	Seeds	3%	44 ^{cd} ± 2.04	68.5^{c}±1.53	17.5 ^{K} ±.521	6.89^{c}±0.130
		5%	42.2 ^{cb}± 2.20	62.7^{e}±1.72	33.1 ^{h}±1.12	2.93^{j}±0.17
Brown Seaweeds		3%	19.8 ^{ef}± 0.81	13.2^{J}±1.24	46 ^{d} ± 1.62	0.83^{L} ±0.12
		5%	17.07 ^{g}± 1.006	17.8^{g}±1.83	49 ^{b} ± 2.03	0.61^{N}± 0.10
Evening primrose		3%	34.2 ^{ef}± 1.22	63.0^{e}±2.09	36 ^{g} ± 1.61	2.56 ^{f} ±0.06
		5%	29 ^{ef}± 1.20	39.2^{g}±2.21	39.6 ^{f} ± 1.10	1.85 ^{g} ±0.15
Mix		3%	57.4 ^{ab} ± 1.43	89.5^{b}±1.52	18.1 ^{K} ± 1.13	8.12^{a} ±0.12
		5%	53.2 ^{bc}± 1.21	66.6^{d}±1.63	20.2 ^{J} ± 1.22	5.93 ^{d} ±0.13

Means in the same row with different letters are significantly different (P⩽0.05

Table (4) : Serum (Glucose) of obese rats as effected by feeding on diets with different Plants and their mix

Diets	Glucose		(g)
Controls	(-)		120 ^{f}±2.01
	(+)		195 ^{a}±3.01
Nabk	Fruit	3%	106 ^{i}± 1.52
		5%	106^{i}± 1.54
	Leaves	3%	95 ^{i}± 2.51
		5%	90 ^{m}± 1.53
	Seeds	3%	130 ^{d}±2.51
		5%	125 ^{e}± 0.81
Brown seaweeds		3%	102 ^{K}± 2.03
		5%	99 ^{J}± 1.23
Evening primose		3%	115 ^{g}± 1.52
		5%	109 ^{h}± 1.72
Mix		3%	144 ^{b}± 1.83
		5%	132 ^{c}± 1.72

Means in the same row with different letters significantly different (P⩽0.5)

Table (5) : Serum (Creatinine, Urea and Uric Acidof obese rats as effected by feeding on diets with different Plants and their mix

Groups \ parameter			Creatinine (Mg/dI (Mean ± SD)	Urea (Mg/dI) (Mean ±SD)	Uric Acid Mg/dI (Mean ± SD)
Controls	(-)		0.88 ±00.2	15.11 ±0.11	0.75 ± 0.02
	(+)		1.41 ± 0.11	15.11 ±0.11	1.30 ± 0.10
Nabk	Fruit	3%	1.25 ± 0.05	16.09 ±0.90	0.83 ± 0.13
		5%	1.21 ±0.11	15.12 ±0.12	0.82 ± 0.12
	Leaves	3%	0.74 ±0.04	15.00 ±0.50	0.64 ± 0.14
		5%	0.70 ±0.10	14.69 ± 0.09	0.60 ± 0.12
	Seeds	3%	1.34 ± 0.12	45.9 ± 0.90	1.00 ± 0.13
		5%	1.30 ±0.10	39.6 ± 0.60	0.95 ± 0.15
Brown seaweeds		3%	0.77 ±0.07	15.43 ± 0.13	0.74 ± 0.14
		5%	0.73 ±0.13	15.01 ±1.00	0.71 ± 0.11
Evening primrosa		3%	1.28 ±0.08	40.5 ±1.50	0.90 ±0.13
		5%	1.26 ±0.06	38.1 ±1.10	0.89 ±0.09
Mix		3%	1.36 ±0.16	46.4 ±1.40	1.13 ± 0.03
		5%	1.30 ±1.10	45.1 ±1.10	1.01 ±0.14

Means in the same row with different letters are significantly different (P⩽0.05)

Tables (6) : Serum (Alkaline ,AST ,ALT)of obese rats as effected by feeding on diets with different Plants and their mix

Groups \ Parameter			Alkaline Phosphatase (U/L) (Mean ± SD	AST/GoT(U/L) (Mean ± SD)	ALT / GPT (U/L) (Mean ± SD)
Controls	(-)		160 ^{m} ±0.50	250 ^{b} ± 1.50	15.11 ^{gh}± 1.50
	(+)		273 ^{a} ± 1.70	250 ^{b} ± 1.50	48 ^{a} ±1.80
Nabk	Fruit	3%	176 ^{g} ±1.70	31 ^{f} ±0.50	16.09 ^{g} ± 2.30
		5%	173 ^{i}± 1.60	29 ^{h}±1.70	15.12 ^{gh} ±1.80
	Leaves	3%	167 ^{K} ±1.50	26 ^{I}±1.80	14.3 ^{h}±1.70
		5%	162 ^{L} ±1.90	21 ^{J} ±1.70	12 ^{K} ±1.50
	Seeds	3%	243 ^{c} ±1.70	40 ^{c} ±1.60	45.9^{bc} ±2.30
		5%	201 ^{f} ±2.00	30 ^{g} ±2.40	39.6 ^{e} ±1.80
Brown seaweeds		3%	175 ^{h}±1.50	29 ^{h}±2.70	15.43 ^{gh} ±1.70
		5%	171 ^{J} ±1.80	26 ^{I}±1.80	15.01 ^{gh} ±1.80
Evening primrosa		3%	235 ^{d} ± 1.60	38 ^{d} ±2.30	40.5 ^{d} ±1.70
		5%	194 ^{N} ± 1.60	35 ^{e} ±2.70	38.1^{f} ±1.80
Mix		3%	204 ^{e}±1.70	41 ^{b} ±1.80	46.4 ^{b} ±2.80
		5%	250 ^{b} ± 1.50	38 ^{d} ±2.70	45.1 ^{c} ±1.80

Means in the same row with different letters are significantly different (P⩽0.05)

5.1.7. Organoleptic evaluation :

Organleptic evaluation of beef bugers (lind quartercut) prepaul after removity all fat tissues. (acerding to (**Negin Yousefi .,** ***et al*** **(2018):**

Barges prtoaed of 2 % meat 73 % ,fat 15%, Add the chilli, garlic, onion, egg, and Worcester (7%) spicel mixture to bugers 5 % - ice

Table (7) Organoleptic evaluation of fried Barges were fined in sunfboweroil, 5% beefburgers as prepased with by (10) panelists in the 5% slimming plants .Agricultural Rescentle , food Technology Res . Instetute .

Powders (average score).

Parameters	Without powdered. Plants (control)	Fruit	Nabak Leaves	Seeds	Brown Algae	Evening Primosa
Taste	9	9	8	6	8	7
Colour	9	9	8	6	7	7
Aroma	9	7	8	7	9	8
Texture	9	8	8	7	8	7
Overall acceptability	9	8.3	8	6.5	8	7.3

Scale :

Very Good	8-9
Good	6-7
Fair	4-5
Poor	2-3
Rejected	<2

Beefburgers wear peraperd without (control) and with slimming powder (5%) after fruing in oil , samples were Organlepticeelly evelwated and mean score given in tubal (7) Lowest score recorded for seeds burger , while highest overall acceptulyility showed for control , nabk fruit , nabk leaves and Brown algae burger (very good)evening primosa burger were (Good) conceidering the overall acceptability. Thereefore nabk fruit , nabk leaves andbrown algae burgers are suggetted for obesity combet, specially when the used meat is low fat . It should be noted that evening primosa burger may be imprsred in qulaity by several practices as adding alkaline phosphate compound for texture , beetjuia for colour an more space for taste , this all 10 my be used for nabk seeds burger . Any how , leaves and brown algea burger rated very

good to good , these were of best qualities considering biological and biochemicall paramters.

Histopathological

It is evidence that control (-)rats revealed sections of healthy liver (photo 1) and kidney (photo 2) while markedhistological changes occurred for obese(c+) rats((photos 3&4) .Feeding on experimental diets improved the structure of liver and kidney . at different degrees .But bestimprovement revealed for Nabk leaves (photos 5&6)

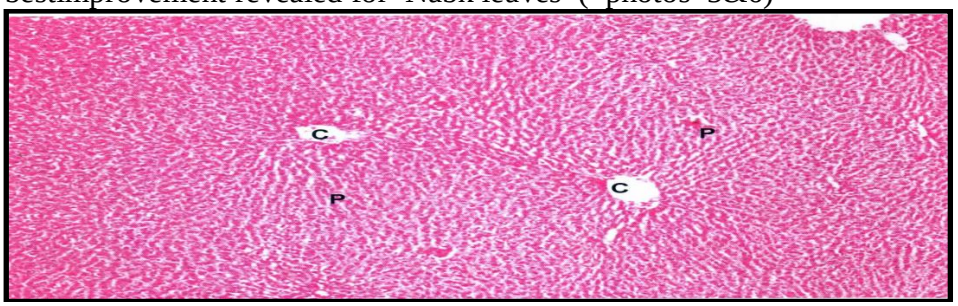

Photo (1) : Liver of rat group 1 (-ve) : Showing normal liver Structure (H& EX 100).

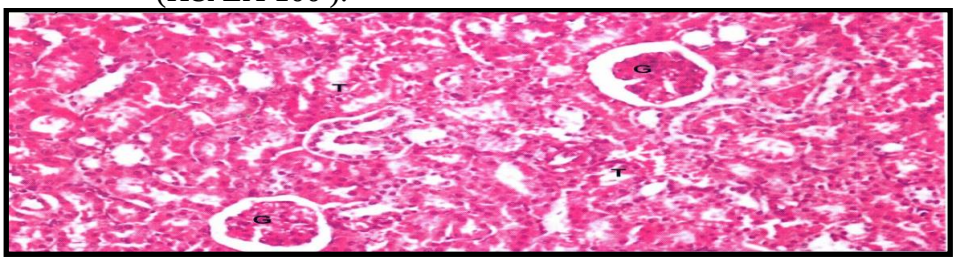

Photo (2): Kidney of control (-) rat showing normal renal glomeruli (G) and renal tubules (T) (H&E, X200).

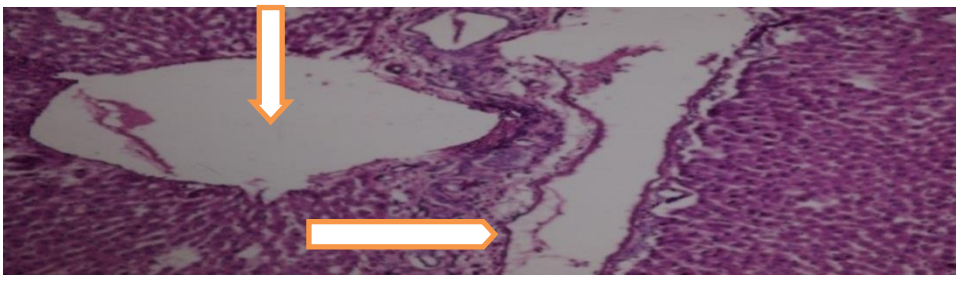

Photo (3) : Liver of rat group 2 (+ve) : Showing dilatation of big vein , infiltrationof mononuclear inflammatory cells, with necrosis of same hepatocytes (H& Ex 100).

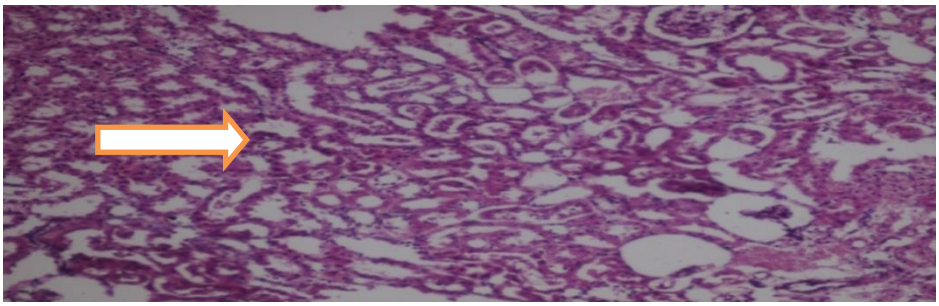

Photo (4) : kidney of rat group 2 (+ve) showing some necrosis of cells lining ren of tubules,shrinkage in glomeruli, with formation of renal of casts (H& EX200) .

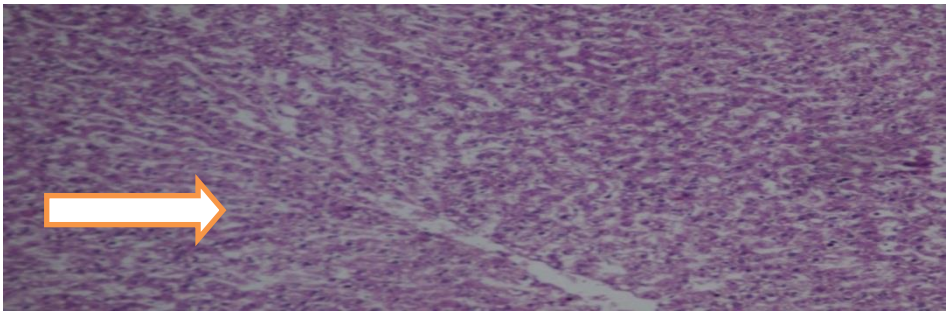

Photo (5) : Liver of rat group 8 (5% Leaves) : Showing edema dispaused hepatocytes organization, some hepatocytes suffer from vacuolar degenerative changes, and necrosis (H& Ex 200**.)**

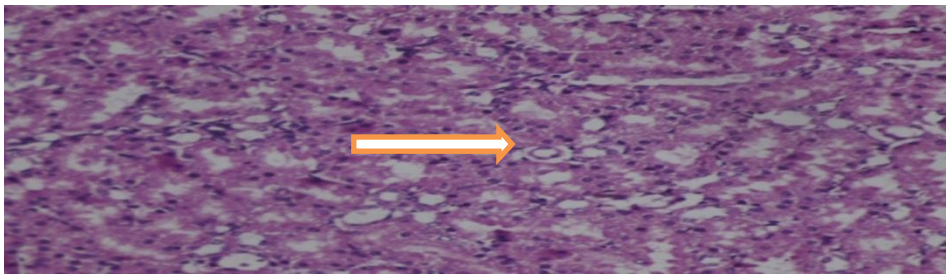

Photo (6) kideny of rat group 8(5% Leaves) Vaccoular degenerative changes of cells lining renal tubules then showing necrosis(H&EX 200)

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تاثير الاغذية المحتوية على زهرة الربيع المسائية والطحالب البنية وأجزاء نبات النبق على الفئران البيضاء البدينة

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الملخص العربى

كان هذا البحث يهدف إلى تقييم التأثير المنحفللنبق (الثمرة والأوراق والبذور)والطحالب البنية البحرية وزهرة الربيع المسائية بمستويات 3 و 5 ٪ في نظام غذائي للفئران الذين يعانون من السمنة بالإضافة إلى خليطها المجهز بنسب مسحوق متساوية. المجموع الكلى 56 ذكر ألبينو. Sprague Dawley قسمت الفئران في 14 مجموعة, 4فئران لكل منهما. البدانة في الفئران سببتها التغذية على نظام غذائي عالي الدهون واستمرت التجربة مدة 28 يوما. في نهاية التجربة قدرت الخواص البيولوجية والكيماوية والحيوية والهستولوجية وكان ملخص النتائج على النحو التالى : لوحظ تحسن واضح عند التغذية على المعاملات و على الاخص اوراق النبق يليةالطحالب البنية وكانت افضل المجموعات التى تناولت اورق النبق بنسبة 5 % بالمقارنة 3 % ولم تسبب إ ضافة كل المساحيق من كل من النباتات فى مخلوط واحد على تقوية وتحسين النتائج .