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EFFECT OF SOME ADDITIVES TO PRODUCE LOW CALORIE BREAD

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ABSTRACT

This study was designed to produce healthy pan bread supplemented with plant nutritional sources rich in fiber. The investigated sources used for supplementation were fine wheat bran, faba bean hulls, dried pea hulls, and brown rice to obtain healthy pan bread. The statistical analysis of the organoleptic evaluation showed that pan bread supplemented with 5%, 10%, and 15% fine wheat bran, faba bean hulls, dried pea hulls, and brown rice of wheat flour (82% extraction) had slight significant differences compared with the control bread. Therefore they were chosen to be evaluated chemically and biologically. The results of chemical evaluation showed that pan bread supplemented with 10% fine wheat bran, or faba bean hulls, or dried pea hulls, or brown rice had the highest value of fiber content (1.74, 2.86, 3.7,.1.92 respectively). While, they had the lowest value of carbohydrates. The results of biological evaluation indicated that, total cholesterol, triglycerides, HDL & LDL-cholesterol and total lipid were significantly decreased in rat groups fed on bread made from (100 % wheat flour). sGOT, sGPT, uric acid, creatinine and serum glucose significantly decreased as compared with the first and second group . So it could be recommended to incorporate the investigated nutritional sources in bakery products to produce healthy products with high fiber content having good biological effect especially for obesity and diabetic patients.

INTRODUCTION

Bread is the principal food around the world provides more nutrients than any other single food source. In 53 % of the countries, bread supplies over 50 % the total calories in take and in 87% of the countries over 30% and about 70% of the total protein the value of grain used for human consumption is over 2.5 times the value of world iron and steel production, with that, only 14% of the grain in the world is handled through international channels, although cereal grains make up more than 1/2 of all the good in overseas trade. (Pelshenke., 1961).

Recommendation of epidemiological and clinical studies support increase consumption of different sources of dietary fibers as part of strategy to protect human being from several disorders and reduce the risk of many diseases such as, heart diseases and diabetes Khalil *et al.*, (2002) stated that dietary fiber acts as bulking agent that increase intestinal motility and moisture content of feces and the reported that in addition some types of plant fiber can lower serum cholesterol. Consumption of grain products with a high content of whole grain flour, milled from all edible components of grains, has been inversely associated with mortality from and incidence of diabetes and ischemic heart disease (IHD) in several prospective population studies (Montonen *et al.*, 2003). Legume seeds are a rich-source of dietary fiber, including its insoluble and soluble fractions (Queiroz-Monici *et al.*, 2005). It has been repeatedly observed that, the type of dietary fiber has a great

impact on large bowel physiology (Juskiewicz *et al.*, 2005). Depending on a diet composition the metabolic processes in that site of GI could be considered as beneficial or detrimental (Remesy *et al.*, 1992).

High-fiber and low-fiber dietary grain (wheat) supplements reduce serum-cholesterol levels about equally, probably because they replace dietary fat (Anderson *et al.*, 1990). Tasci *et al.*, (1990) evaluate the effect of wheat bran supplements bread on blood responses in diabetics. Mean values of serum cholesterol, triglycerides and total lipids decreased significantly. Dry beans and soybeans are nutrient-dense, fiber-rich, and are high-quality sources of protein. Protective and therapeutic effects of both dry bean and soybean intake have been documented. Studies show that dry bean intake has the potential to decrease serum cholesterol concentrations, improve many aspects of the diabetic.(Anderson, et al ., 1999).

The effect of a pea cell wall fiber preparation with a high content of soluble fiber on fasting and postprandial blood lipids was investigated in young healthy subjects. Inclusion of 33 g pea fiber product/10 MJ (20 g dietary fiber) in a low fiber diet was tested in five men and six women (mean age 23 y) a 2-wk period of habitual diet consumption No significant differences in fasting concentrations of total cholesterol, LDL cholesterol or HDL cholesterol were observed, whereas total and VLDL triglyceride concentrations were lower when subjects consumed the pea fiber diet compared with the low fiber diet ($P < 0.05$) (Sandstrom *et al.*, 1958).

Madar., (1983) investigate of the effect of brown rice and soy bean dietary fiber on plasma triglyceride and cholesterol. They found that soya bean significantly decreased triglyceride values whereas rice fiber had no effect.

This study was designed to utilize some cereal by- products especially those rich in dietary fibers fine wheat bran, faba bean hulls, pea hulls and brown rice for pan bread making as well as to study the effect of substitution of wheat flour on physical, chemical, biological and sensory properties of pan bread**.**

MATERIALS AND METHODS

I. Materials:

Wheat flour (Triticum vulgara) 82%, extraction, wheat bran (fine) were obtained from the Eastern Delta flour Mill Company, Egypt, faba bean hulls (Vicia faba L.) from the local market, pea hulls (Pisum sativum) were collected from Aga Egyption (canning, Aga, Dakahlia, Egypt, brown rice (Oryza sativa) were collected from Delta Company for Rice Milling New Damietta, Damietta Governorate, Egypt, Sugar, fats, salt, dry yeast, milk powder and improver were collected from the local market of Mansoura City.

Animals:

Adult male of white albino rats wister strain weighing between (130 -180g) provided from of department of animals experimental Food Technology Research Institute, Giza, Egypt. Rats were housed as groups in wire cages under the normal laboratory conditions and fed on basal diet for as adaptation period. Fee and water were provided adlibitum. Gain in body weight and food intakes were recorded weekly, experimental period was 4 weeks.

Alloxan: Pure chemical fine (BDH) was used animal to cause diabetes by induced intraperitioneally injection of 150 mg/kg body weight of alloxan monohydrate dissolved in 0.9 % W/V of Nacl according to the method described by Porchezian *et al.*,(2000).

II.Methods:

Preparation of pan bread from wheat flour (82% extraction) and it's mixture:

Bread making process:

The conventional straight dough process for pan bread was performed according to the routine method of Egyptian Baking Technology Center, Giza, Egypt.

The basic pan bread making formula was as follows:

Ingredients: wheat flour 82% extraction (100 g), sugar (5 g), fats (5 g), salt (1g), active dry yeast (1.5 g), milk powder (2g), improver (1g). The ingredients were mechanically mixed for 12 min, and then dough was left for 2hr. Then the dough was divided into equal parts of a bout 165 gm pieces, rested for 2 hr to be fermented then made into loves. The loaves were baked at 220 ^{o}C for 15 minutes in the baker house. All loaves were package in polyethylene bags after cooling for investigation.

Chemical Analysis:

Moisture, ash, crude protein, crude fat and crude fiber were determined according to the method of (A.O.A.C., 2000), while total carbohydrates were estimated by subtracting the difference from initial weight of the samples.

Energy value:

Energy value was calculated according to (James., 1995).

Physical measurements of pan bread:

Weight (g) and volume (cm^3) of resulted loaves were measured by scale and rapeseed displacement method according to (AACC, 2000). Specific volume (cm^3/g) was calculated by dividing loaf volume by its weight.

Organoleptic evaluation of pan bread:

Bread samples were evaluated organoleptically by a panel of 10 experienced panelists for: Appearance, color of crust, color of crumb, distribution of crumb, homogenous, taste, odor, and acceptability, as the method described by (Matz, 1960).

Preparation of diabetic rats:

Diabetes was induced in normal healthy Albino rats by intraperitoneal injection of alloxax 150 mg /kg body weight according to the method described by (Desai and Bhide., 1985).

Experimental design: The rats were divided into 7 groups each of 5 rats.

Group (1): Rats fed on basal diet (negative control).

Group (2): Diabetic rats fed on basal diet (positive control).

Group (3): Diabetic rats fed on basal diet with (Pan Bread) (100%wheat flour 82%extraction control).

Group (4): Diabetic rats fed on basal diet with pan bread (90%wheat flour +10% fine wheat bran).

Group (5): Diabetic rats fed on basal diet with pan bread (90%wheat flour +10% faba bean hulls).

Group (6): Diabetic rats fed on basal diet with pan bread (90%wheat flour +10% dried Pea hulls).
Group (7): Diabetic rats fed on basal diet with pan bread (90%wheat flour +10% brown rice).

Table (1): Composition of the basal diet:

Ingredient	g/100 g diet
Corn starch	65
Casein	15
Corn oil	10
Salt mixture	4
Cellulose	5
Vitamins mixture	1

The basal diet used was that proposed by (Turn land and margen., 1979).

Biochemical measurements:
The analysis experiment were as follows:
(1) Determination of serum glucose, was measured according to Trinder., (1969).
(2) Total cholesterol, was measured according to (Allain *et al.*, (1974).
(3) Serum triglycerides**,** was measured according to (Fossati and prencipe., (1982).
(4) (HDL – c), (LDL- c)**,** were measured according to (Lopez., 1977).
(5) Total lipids, were measured according to (Friede Wald *et al.*, 1972).
(6) Liver transaminases (GPT&GOT) by (Enzymatic-colorimetric test)**,** were measured according to (Reitman and Frankel (1959).
(7) Uric acid and creatinine were measured according to (Barham and Trinder, 1972, and Henry, 1974), respectively.

Statistical Analysis:
Statistical Analysis of the data was performed using the Statistical program (SAS, Statistical Analytical, 1996).

RESULTS AND DISCUSSION

Chemical composition of raw materials: Table **(2)** represent the wheat flour (82% extraction) and dried pea hulls containing 12.74% moisture followed by fine bran which recorded 11.20%, while, the lowest value was 9.02% for brown rice, dried pea hulls had higher levels of crude protein (25.75%), followed by faba bean hulls, (17.67 %), as compared with other additives. The crude fat content was higher in fine bran (1.73%) than other raw materials. Also table(2) showed that, dried pea hulls contained the highest value of crude fibers (27.20 %), followed by brown rice, faba bean hulls, fine bran and wheat flour which contained 8.79%, 8.20%, 7.02% and 0.82% respectively. From the same table, it could be noticed that dried pea hulls had the highest content of ash (4.60%) followed by fine bran (3.90%), while the lowest value of ash was (0.53%) in brown rice. furthermore, the same results in table (2) revealed that wheat flour (82% extraction)contained the highest value of carbohydrates (85.90%) followed by brown rice, fine

bran, faba bean hulls and dried pea hulls which contained 81.83%, 78.38%, 71.62% and 41.47% (on dry weigh basis) respectively.These results are in agreement with thoses of Abd El- Monem *et al.*, (1994), El adwi., (1997), and Hassan., (2003).

Table (2): Chemical composition of different raw materials (% dry weight basis).

raw materials / Component	Wheat flour 82%	Fine wheat bran	Faba bean hulls	Dried pea hulls	Brown rice
Moisture%	12.74	11.2	9.48	12.74	9.02
Crude protein (Nx 5.7) %	11.38	8.97	17.67	25.75	7.44
Crude fat%	0.98	1.73	0.79	0.98	1.41
Crude fiber%	0.82	7.02	8.2	27.2	8.79
Ash%	0.92	3.9	1.72	4.6	0.53
Carbohydrates%	85.9	78.38	71.62	41.47	81.83
Energy(Cal/100gm)	397.94	364.97	364.27	277.7	369.77

Carbohydrates =100 – (% Protein + % Fat + % Fiber + % Ash).

Sensory evaluation of pan bread

The data in table (3) indicated that the pan bread made from 10% with additives was more acceptable than other samples produced contain 15 % with additives. Sensory scores of the pan bread samples 89.3 % pan bread control , 75.9 % (10 % fine wheat bran), 68.4% (10 % faba bean hulls) , 71 % (10 % dried pea hulls) and 71.9 % (10 % brown rice) respectively.

Baking properties

Data presented in table (4) shows detectable decrease in loaf volume and increase in loaf weight of pan bread made from 10 % fine wheat bran, faba bean hulls, dried pea hulls and brown rice as compared pan bread control (100 % wheat flour). The changes in the loaves volume are due to the changes in the quality and quantity of protein. The highest specific volume was recorded in pan bread control (3.81 cm^3), while, addition of fine wheat bran or faba bean hulls or dried pea hulls or brown rice to wheat flour 82 % extraction caused a decrease in specific volume. Yook *et al.*, (2000) reported that, the decrease in loaf volume attributed to poor gas retention of dough as well as to the dilution of gluten protein achieved by the various materials.

Chemical composition of pan bread:

Chemical composition of pan bread are summarized in table (5). Moisture content ranged between (39.42- 36.70%), while, the highest levels in protein content pan bread made from 10%dried pea hulls (14.37%) followed by pan bread made from 10% faba bean hulls (13.56%) as compared pan bread control and other additives. Also only little differences existed in the fat content among the tested samples. Crude fiber content ranged between (1.12 – 3.76%). Pan bread made from 10% faba bean hulls recorded (2.63%) ash content, but the lowest levels in ash content (1.91%) in pan bread made from 10% brown rice. Total carbohydrates content was ranged between (78.69- 83.3%).

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All samples ingredients caused reduction in caloric value of breads ranged between (379.98–391.72Cal/100g) These results are in agreement with Cavallero *et al.*, (2002) and Hassan., (2003

Table(4): Baking properties of pan bread made from substituted wheat flour with various sources of fiber..

Properties / Samples	Volume (cm^3)	Weight (g)	Specific volume (cm^3/g)
(1) Pan bread control (wheat flour 82 % extraction)	550	144.35	3.81
(2) Pan bread (90% wheat flour + 10% fine wheat bran).	400	148	2.7
(3) Pan bread (90% wheat flour + 10% faba bean hulls).	460	155.6	2.96
(4) Pan bread (90% wheat flour + 10% dried pea hulls).	350	158.3	2.21
(5) Pan bread (90% wheat flour + 10% brown rice).	350	151.5	2.97

Table(5): Chemical composition of pan bread with some additives

Component / Samples	Moisture %	Protein %	Fat %	Fiber %	Ash %	Carbohy-drates%	Energy Cal/ 100g
pan bread made from 100% wheat flour 82%	36.70	12.93	0.80	1.12	1.95	83.3	391.72
pan bread made from (90%wheat flour+10%fine bran)	39.04	12.69	0.72	1.74	2.25	82.6	387.64
pan bread made from (90%wheat flour+10%faba bean hulls)	38.70	13.56	0.85	2.86	2.63	80.1	382.29
pan bread made from (90%wheat flour+10%dried pea hulls)	39.42	14.37	0.86	3.76	2.32	78.69	379.98
pan bread made from (90%wheat flour+10%broun rice)	39.22	12.54	0.90	1.92	1.91	82.73	389.18

Body weight gain, food intake and food efficiency ratio (FER):

Data presented in table (6), demonstrated the initial weight, body weight gain, food intake and food efficiency ratio, of rat fed on pan bread made from 100% wheat flour 82% extraction and 10 % of some additives under study diets. There are difference of initial weight within all groups. the body weight gain show difference between negative control and positive control (21.67± 4.70 gm/rat) and **(**26.00± 2.31 gm/rat). There are significant difference in body weight gain between positive control and all groups. The improvement in body weight gain of rats fed on pan bread made from100% wheat flour 82% extraction and 10 % of some additives diets related to beneficial effect of fiber in regarding the effect of positive control on reducing body weight gain. These are results are in agreement with those reported by El adawi .,(1997).The highest percent in body weight gain per day was for group (6), while the lowest percent is gained in positive control. Food efficiency ratio, show significant decrease difference between the negative control and positive control (2.36± 0.29 ratio) and (3.01 ±0.15 ratio), also there are significant difference between two groups and the other fiber diets groups. These results are in agreement with those obtained by (Dalia et al, 1997). In the present study, dietary fiber may improve the metabolic disorders in diabetic rats and therefore the body weight would be decreased. So, it can be concluded that the rats group(6) and group(5), the best groups (compared with other

groups), which effect on initial weight, final weight, body weight gain, food intake and food efficiency ratio (FER) for its high content of fiber compounds.

Table (6): Mean values ± SD of body weight gain, food intake and food efficiency ratio (FER), of rats fed on pan bread made from wheat flour and some additives diets.

Variable / Groups	Initial body weight (gm)	Final body weight (gm)	Gain in body weight (gm)	Food intake (gm)	º food efficiency ratio
Group(1) Basal diet(-) Control	130.67± 17.27	152.33± 21.42	21.67± 4.70	15.91± 0.02	2.36± 0.29
Group(2) Basal diet(+) Diabetic rats	146.67± 1.67	152.67± 2.85	26.00± 2.31	15.91± 0.01	3.01± 0.15
Group(3) Basal diet+ wheat pan bread	145.00± 6.93	175.00± 4.04	30.00± 2.89	15.83± 0.09	0.63± 0.18
Group(4) Basal diet+ pan bread(90%wheat flour+10%fine bran)	147.67± 8.38	171.00± 7.81	33.33 ± 0.66	15.85± 0.03	0.84± 0.05
Group(5) Basal diet+ pan bread(90%wheat flour+10%faba bean hulls)	133.33± 5.79	178.00± 5.13	44.67± 8.89	15.93± 0.02	0.82± 0.51
Group(6) Basal diet+ pan bread(90%wheat flour+10%dried pea hulls)	158.00± 13.58	189.33± 4.26	31.00 ± 9.02	15.66± 0.33	0.99± 0.57
Group(7) Basal diet+ Pan bread (90% wheat flour+10%broun rice)	126.67± 7.17	155.67± 7.36	25.00 ± 6.51	15.40± 0.28	0.57± 0.41
F value	4.52**	1.57**	3.25**	0.05*	35.69**

Significant with negative control group * p< 0.05p<0.01***p<00.1.**
Mean values in each column having different superscript (a , b , c …) are significantly different at p< 0.05.
food efficiency ratio = body weight gain/ food intake

The values of are tabulated in table (7) , the data revealed that the highest value of total cholesterol is (79.58± 4.46 mg/dl) for group (7) fed on pan bread made from 10 % brown rice), followed by group (1), Negative control and Positive control (73.20 ± 2.26 mg/dl), (71.38± 4.36 mg/dl) respectively, while there are no significant differences in the other groups. The lowest value of total cholesterol is (55.71±6.25 mg/dl) for group (6) fed on pan bread made from 10 % dried pea hulls. The same table show that the highest value of triglycerides is (95.37 ±2.77 mg/dl) for positive control followed by group (5) and group (4) (87.92 ± 1.77 mg/dl) and (82.73 ±9.90 mg/dl) respectively, while the lowest value of triglycerides is (73.27 ±3.48 mg/dl) for group (6). The results listed in Table (7) show that the highest value of HDL-C is (47.47± 1.69 mg/dl) for positive control . these values are decreased in group (5), group(3) and group (6).(44.1± 0.92 mg/dl),(41.19± 2.09 mg/dl) and (38.63± 5.80 mg/dl) respectively. The hypocholesterolemic effects of fiber occur by the increase of HDL-c level which led to increase in the follow of cholesterol to liver converted to other compounds (Galibois *et al.*, 1994). From the same table the data revealed that the highest value of LDL-c is (37.64± 3.74 mg/dl) for positive control , followed by negative control, group (3) and group (7), (34.61±13.31mg/dl), (34.62± 1.30 mg/dl) and (31.37 ±11.69 mg/dl) respectively. The lowest value of LDL-c is (25.27 ±2.25 mg/dl) for group (6).

The data in table (7) show that positive control recorded the highest value of VLDL-c (17.74± 0.66 mg/dl) and followed by Negative control,

while.The lowest value of VLDL-c is (10.16± 3.49 mg/dl) for group (6). The table (7) revealed that the total lipids in rats serum show no significant increase difference between positive control and negative control. There are significant difference between these two groups and the other groups. The highest value of total lipids is (383.89± 11.88 mg/dl) for negative control. followed by positive control (380.53±11.29 mg/dl). The value is decrease significantly upon group (4) fed on pan bread made from 10 % fine wheat bran, group (5) and group (6), (287.01±32.76 mg/dl), (286.99± 6.74 mg/dl) and (231.74± 25.21 mg/dl) respectively. The reduction of total lipids may be due to the effect of investigated material in the present study.

Results in Table (8) appeared that, rats fed on with pan bread made from 10 % dried pea hulls had significantly lower the level of serum glucose (173.00±13.50 mg/100ml) than those of rats fed on basal diet (positive control). (280.33± 37.77 mg/100ml0). The diet rich in highly viscous soluble dietary fiber has been proven effective in reducing blood glucose levels with a mechanism mainly related to their effect on gastric emptying where highly viscous chyme slow gastric emptying and reduces the rate of intestinal absorption of glucose. (Wood *et al* ., 2000 and Cavallero *et al.*, 2002).

Table (7) : Influence of feeding pan bread with 10% levels of fiber from (fine bran, faba bean hulls, dried pea hulls, and brown rice) on serum total cholesterol (mg/dl).

Groups	Total cholesterol (mg/dl)	Triglycerides (mg/dl)	°HDL-c (mg/dl)	°°LDL-c (mg/dl)	°°°VLDL-c (mg/dl)	Total lipids (mg/dl)
Group(1) Basal diet(-) Control	73.20± 2.26	75.83± 2.88	47.33± 7.25	34.61± 13.31	16.84± 0.68	383.89± 11.88
Group(2) Basal diet(+) Diabetic rats	71.38± 4.36	95.37± 2.77	47.47± 1.69	37.64± 3.74	17.74± 0.66	380.53± 11.29
Group(3) Basal diet+ wheat pan bread (100% wheat flour)	61.93± 7.45	81.83± 5.05	41.19± 2.09	34.62± 1.30	11.32± 1.54	333.86± 35.21
Group(4) Basal diet+ pan bread (90%wheat flour+10%fine bran)	62.87± 4.69	82.73± 9.90	45.33± 3.15	27.35± 2.77	15.12± 0.31	287.01± 32.76
Group(5) Basal diet+ Pan bread (90%wheat flour+10%faba bean hulls)	57.63± 7.45	87.92± 1.77	44.13± 0.92	27.77± 4.66	15.61± 0.35	286.99± 6.74
Group(6) Basal diet+ pan bread (90%wheat flour+10%dried pea hulls)	55.71± 6.25	73.27± 3.48	38.63± 5.80	25.27± 2.25	10.16± 3.49	231.74± 25.21
Group(7) Basal diet+ pan bread (90%wheat flour+10%brown rice)	79.58± 4.46	81.37± 3.37	46.59± 3.60	31.37± 11.69	13.24± 2.83	301.00± 31.88
F.Value	17.08*	22.5*	30.85*	21.07*	23.45*	18.99**

Significant with negative control group * p< 0.05p<0.01***p<00.1.**

Mean values in each column having different superscript (a , b , c …) are significantly different at p< 0.05 .

°HDL-c : High density lipoprotein cholesterol .

°°LDL-c: Low density lipoprotein cholesterol . °°°VLDL-c : very low density lipoprotein cholesterol .

Table (8): Influence of feeding pan bread with 10% levels of fiber from (fine bran, faba bean hulls, dried pea hulls, and brown rice) on serum glucose (mg/100ml).

Groups / variable	After adaptation	After 2 weeks	After 4 weeks
Group(1): Basal diet (negative control)	92± 6.43	96.67± 28.59	98.33± 15.90
Group(2): Basal diet (positive control)diabetic rats	225.33± 8.37	334.33± 69.62	280.33 ± 37.77
Group(3) Basal diet+ Wheat pan bread	145.67± 60.25	465.33 ± 24.91	297.67 ± 18.58
Group(4): Basal diet+ Pan bread (90%wheat flour+10%fine bran)	134.00± 13.20	227.00 ± 9.29	175.33± 4.66
Group(5): Basal diet+ Pan bread (90%wheat flour+10%faba bean hulls)	97.33± 13.54	412.00 ± 57.83	266.33± 37.86
Group(6): Basal diet+ Pan bread (90%wheat flour+10%dried pea hulls)	103.00± 7.09	257.00± 36.11	173.00± 13.50
Group(7): Basal diet+ Pan bread (90%wheat flour+10%brown rice)	93.33± 6.96	380.00± 45.24	240.00± 5.77
F.Value	7.86**	19.55**	8.94**

Significant with negative control group * p< 0.05p<0.01***p<00.1.**

Mean values in each column having different superscript (a , b , c …) are significantly different at p< 0.05 .

The table (9) show that the serum GOT and GPT for positive control recorded the highest values (81.35±2.75 u/L) and (74.97± 0.90 u/L) followed by group (7) (48.25±1.66 u/L) and (44.07±1.62 u/L). negative control (48.20±0.80 u/L) and (41.97±1.52 u/L) and group (3) ,(44.83 ±4.89 u/L) and (40.5 ±4.45 u/L), while, the lowest value recorded (43.68±2.18 u/L) and (37.70±2.20 u/L) for group (4), followed by group(5), and group (6), (33.13±0.97 u/L and 44.40± 4.45 u/L) and (32.97±2.01 u/L and 35.5±1.10 u/L) respectively.

Table (9) also, illustrate the effect of pan bread with 10% fine bran, faba bean hulls, dried pea hulls, and brown rice diets on serum uric acid and creatinine .The value of uric is (5.54± 0.02 mg/dl) for positive control then is decrease significantly upon treatment to (3.97± 0.30 mg/dl) for group (3) and (3.60 ±0.15 mg/dl) for negative control, also, the other values are decrease gradually for group(4), group(5), group(7) and group (6) respectively.

Regarding, creatinine there are no significant differences between positive group and the other groups. The highest value of creatinine (0.68± 0.06 mg/dl) for negative control followed by group (6), group (7) and positive control (0.64± 0.10 mg/dl),(0.64±0.05 mg/dl) and (0.63± 0.01 mg/dl).

So, it could be concluded that , cereal bran are important providing dietary fiber so, plays a significant curative and preventative role towards naturally anti-diabetic activity as hypoglycemic agent. It could be recommended that the wheat bran, faba bean hulls, dried pea hulls and brown rice can be used at level 10 % with wheat flour 82 % extraction to make bread could be reduce lipid pattern in diabetic rats**.**

Table (9): Influence of feeding pan bread with 10% levels of fiber from (fine bran, faba bean hulls, dried pea hulls, and brown rice) on serum liver enzymes , creatinine and uric acid (mg/dl).

Variable \ Groups	sGOT	sGPT	Creatinine	Uric acid
Group(1) Basal diet(-) Control	48.20± 0.80	41.97± 1.52	0.68± 0.06	3.60± 0.15
Group(2) Basal diet(+) Diabetic rats	81.35± 2.75	74.97± 0.90	0.63± 0.01	5.54± 0.02
Group(3) Basal diet+ wheat pan bread (100% wheat flour)	44.83± 4.89	40.5± 4.45	0.52± 0.01	3.97± 0.30
Group(4) Basal diet+ pan bread (90%wheat flour+10%fine bran)	43.68± 2.18	37.70± 2.20	0.54± 0.01	4.40± 0.54
Group(5) Basal diet+ pan bread (90%wheat flour+10%faba bean hulls)	33.13± 0.97	44.40± 4.45	0.58± 0.01	4.24± 0.08
Group(6) Basal diet+ pan bread (90%wheat flour+10%dried pea hulls)	32.97± 2.01	35.50± 1.10	0.64± 0.10	4.05± 0.18
Group(7) Basal diet+ pan bread (90%wheat flour+10%broun rice)	48.25± 1.66	44.07± 1.62	0.64± 0.05	4.22± 0.24
F.Value	25.5^{**}	26.06^{**}	0.02^{NS}	0.1^{*}

Significant with negative control group * p< 0.05p<0.01***p<00.1.**

Mean values in each column having different superscript (a , b , c …) are significantly different at p< 0.05 .

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تأثير بعض الإضافات لإنتاج خبز منخفض السعرات

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الهدف من هذه الدراسة هو إنتاج خبز قوالب صحي عن طريق الاستفادة من الدور الحيوي للألياف الغذائية في الوقاية من العديد من الأمراض الشائعة مثل السمنة ومرض السكر، و لهذا اختيرت مصادر طبيعية غذائية غنية في محتواها من الألياف ومنها نخالة القمح الناعمة- قشور الفول البلدي- قشور البسلة الجافة ومطحون الأرز البني بنسب مختلفة ضمن مكونات خبز القوالب ثم تقييم الناتج النهائي حسيا ، طبيعيا، كيميائيا وبيولوجيا. أظهرت النتائج الاتى :- بإجراء التقييم الحسي للخبز الناتج من دقيق القمح (استخلاص ٨٢%) والمدعم ب١٠% من نخالة القمح الناعمة- قشور الفول البلدي- قشور البسلة الجافة والأرز البني) كانت مقبولة حسيا لارتفاع محتواها من الألياف مقارنة بالكنترول والخلطات الأخرى وتم تقييمها كيميائيا وطبيعيا وحيويا وأوضحت نتائج التحليل الكيماوي أن الخبز المدعم ١٠% من نخالة القمح الناعمة- قشور الفول البلدي- قشور البسلة الجافة والأرز البنى ارتفع محتواه من الألياف مقارنة بالكنترول وكانت ١,٧٤، ٢,٨٦، ٣,٧٦، ١,٩٢ على التوالي في الخبز الناتج وانخفاض محتواها جميعا من الكربوهيدرات .

وبإجراء التقييم الحيوي وجد حدوث تحسن ملحوظ في الكفاءة الغذائية وانخفاض في الكوليستيرول الكلى و الجليسريدات الثلاثية الكلية و الليبوبروتينات منخفضة وشديدة الانخفاض وعالية الكثافة ومستوى الجلوكوز في الدم وحدوث تحسن في تركيزات اليوريا وحامض اليوريك والكرياتينين في السيرم وكذلك محتوى السيرم من إنزيمات الكبد مقارنة بالمجموعة الأولى (الكنترول السالب) والثانية فئران مصابة بالسكر(الكنترول الموجب).

وتوصى هذه الدراسة بإضافة هذه المصادر في منتجات المخابز لإنتاج مخبوزات صحية عالية القيمة الحيوية لارتفاع محتواها من الألياف وخاصة لمرضى السمنة والسكر.

قام بتحكيم البحث

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Table (3):Organoleptic properties of Pan bread from wheat flour and wheat flour with fine wheat bran ,or faba bean hulls, or dried pea hulls, orbrown rice

Panel test Samples	Appearance (20)	Colour of crust (10)	Colour of crumb (10)	Distribution of crumb(20)	Homogenous (10)	Taste (20)	Odour (10)	Total (100)
(1) Pan bread control (wheat flour 82 %extraction)	17.7	9	8.7	18.1	8.5	18.7	8.6	89.3
(2) Pan bread (95% wheat flour + 5% fine wheat bran)	14.1	7.8	7.5	17.1	7.3	17.2	7.7	78.7
(3) Pan bread (95% wheat flour + 5% faba bean hulls)	12.4	6.7	6	16	7.1	16.2	6.9	71.3
(4) Pan bread (95% wheat flour + 5% dried pea hulls).	13.4	6.6	6.5	16.6	6.4	17	7.3	73.8
(5) Pan bread (95 % wheat flour + 5% brown rice)	13.9	6.8	6.7	16.4	6.5	17.1	6.8	74.2
(6) Pan bread (90% wheat flour + 10% fine wheat bran).	14.6	7	7.1	16.8	6.2	17.1	7.1	75.9
(7) Pan bread (90% wheat flour + 10% faba bean hulls).	12.2	6.4	5.6	15.9	6	16.2	6.1	68.4
(8) Pan bread (90% wheat flour + 10% dried pea hulls)	13.6	6.2	5.9	15.8	6.1	17.1	6.3	71
(9) Pan bread (90% wheat flour + 10% brown rice).	13.7	6.5	6.5	16.3	6.2	16.4	6.3	71.9
(10) Pan bread (85% wheat flour + 15% fine wheat bran).	14	6.7	6.6	16	6.6	16.6	6.5	73
(11) Pan bread (85% wheat flour + 15% faba bean hulls).	10.1	5.1	4.3	14.1	4.8	14.4	5	57.8
(12) Pan bread (85% wheat flour + 15% dried pea hulls).	10.5	4.9	4.6	14.1	4.8	14.7	5.2	58.8
13) Pan bread (85%wheat flour + 15% brown(rice)	14	6	6	15	5	14	5	65