

NATURAL ADDITIVES TO PRODUCE HIGHT NUTRIENT VALUE

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ABSTRACT: Carrot powder, beet root powder, curcumin powder and wheat grass [jointing stage} were. Separately added to wheat flour to produce colored healthy crackers. Wheat grass at jointing stage consider an excellent source of vitamins A, B ·C, E and K, as well as calcium, chlorine, iron, magnesium, phosphorus, potassium, sodium, sulphur, cobalt and zinc. Further, the chemical structure of the chlorophyll molecule in wheat grass reveals that it is remarkably adapted to utilization of the human blood stream, by virtue of its similarity to the hem in molecule of hemoglobin.

Chemical composition, rheological properties, sensory evaluation, biological experiment and statistical analysis were carried out. The results declared that healthy crackers was more nutritional values, and have a good technical properties. Biological experiment showed that, healthy crackers increased blood hemoglobin, feed intake, body weight and liver weight. On the other hand, decreased blood glucose, serum uric acid, blood urea and serum creatinine contents, total cholesterol, total lipids and triglycerides.

INTRODUCTION

Wheat grass:

The effect of wheat grass juice on the diseased organism was provides an optimal nutritional environment for the healing process .Scientific analysis has demonstrated wheat grass is a perfectly complete food itself, capable of sustaining life in a healthy way. Fisher et al., 1954 have been got a good results when using chlorophyll in the treatment of anemia. Yong and Beregi, 1980 isolated over loo elements, including all the known minerals, from wheat grass. Calculations indicate that 15lbsof fresh wheat grass is equivalent in nutritional value to 350lbs of choicest vegetables. Kuboto and Mtsuoka 1984 reported that, wheat grass is becoming one of the most widely used supplemental health

foods. It contains chlorophyll, 20 amino acids, several hundred different enzymes not found in other foods, as many as 90 out of 102 possible minerals, vitamins and other important nutrients. It is perfect for healthy immune system. Patek and Minot, 1984 observed that, a positive increase in hemoglobin concentration on intravenous injection of chlorophyll derivative. Wigmore 1985 declared that, there is evidence which suggests that green foods or foods higher in chlorophyll may inhibit the damage caused to cells by X radiation. She used wheat grass in her program, it have anti cancer activity. She feels that young grasses and other chlorophyll-rich plants are a safe and effective treatment for ailments such as high blood pressure, some cancers, obesity, diabetes, gastritis. ulcers, pancreas and liver problems, fatigue, anemia, asthma, eczema, hemorrhoids, skin problems, halitosis, body odor and constipation Patek 1986 used 15 adult patients with chronic hypochromic anemia. They were given chlorophyll and allied substances and placed on diets free from meat and eggs, but adequate in other respects. It was found that pure chlorophyll alone was not effective. When chlorophyll and its derivatives were administered there was an increase in hemoglobin and an improvement in the sense of well-being. Battersby, 1988 reported that, chlorophyll is the green pigment of plants which initiates photosynthesis by absorbing energy from sunlight and transferring this energy to other molecules. Chlorophyll causes carbon dioxide and water to combine into glucose. Chlorophyll contains enzymes and superoxide dismutase, a copper-containing protein found in mature red blood cells. This enzyme decomposes superoxide radicals in the body into a more manageable form, thereby helping to slow down the aging process. Miller et al., 1988 declared that chlorophyll molecule closely resembles hemin, the pigment which combines with protein to form hemoglobin, it is nature's blood-building element for all plant eaters and human.

Carrot

Carrots contain large amounts of Beta-carotene. In most cases we are told that cooked vegetables decreased in its nutritional value and that most vegetables have the maximum amount of vitamins. However in the raw materials of carrots, cooking them actually helps the body to absorb the beta-carotene 4-5 times more by breaking down their touch cell walls, and darker older carrots are also more nutritional than baby new carrots and cooking, eating them with a meal that contains a small amount of fat will aid in the absorption of the antioxidant Beta-carotene Scott, M.

1986. The use of pureed carrot is used for diarrhea and is particularly good for children and infants as a good form of medicine. Morton 1990 reported that 6mg of beta- carotene correspond to 1 mg retinol (vitamin A). He also added that, it is safe to use beta-carotene, hence even very large doses do not lead to the toxicity symptoms or embryo damage. in this concept , it could be mentioned that, vitamin A (retinol) is not a strong antioxidant, like its precursor beta- carotene, but retinol has many other vital function. Moreover, vitamin A and beta-carotene can protect the cell membranes and other cellular structures from the damage caused by free radicals. Kragh and Anderson 1994 reported that retinol is almost never found in food products of plant origin but carotenoids may be present. The most important one of the carotenoids called beta-carotene. Pumpkin ,carrot and sweet potatoes are extremely rich in beta-carotene.

Beet root

Beet root's main benefits are that it contains no fat, very few calories (100g = 36 calories), and high source of fiber. Beet root contains folate, potassium, manganese, iron, and some vitamin C Lakhapal et.al. 1966. They also reported that, the green leafy tops are especially nutritious as they contain calcium, beta-carotene and iron. The roots and greens therefore are great for women in general and for those planning pregnancy. Henry 1974 revealed that beet root contained 14 amino acids, nine of which were able to identify, and which include leucine, tryptophane, valine, alanine, tyrosine, glutamine, and ornithine. He also declared that there was an alkaloid called allantoine present in beet root, this had an antitumor effect. Bandyopadhyay,1996 reported that, the high vitamin P content (rutine , a flavon derivative) is very useful in improving the permeability of the cell wall and also has the ability to fix 2 H atoms. This means that the five active components of beet root (betanidine, allantoine, farnesol, vitamins C and F) can fix 16 H atoms, which possibly is the explanation for the greatly improved cell respiration (about 70%) after administering beet root.

Turmeric

Turmeric is a native of South East Asian countries with probable origin in the west coast of India. Turmeric belongs to the Zingiberaceae family and genus *Curcuma* it is a rhizomatous herb whose botanical name is *Curcuma longa* Linn. It consists of volatile oils, fixed oils, oleoresin, ash, moisture and the peptide turmerin. Wagner 1989 reported

that, extracts from several plant spices, including turmeric, inhibit platelet aggregation and modulate eicosanoid biosynthesis. Due to their eicosanoid — modulating property, it was suggested that, the spices may serve to provide clues to drugs directed to arachidonic acid pathway enzymes as pharmacological targets. Goud 1993 observed that, *E. coli* is known to be the most common cause of urinary tract infections, gram negative sepsis. and several gastrointestinal diseases in both humans and animals, but recently *E. coli* is known to be a big health hazard with its particular strain 0157. In the previous study, it was shown that a low dose (2-4mg/mi) of Turmeric could kill a gram-negative bacteria, such as *E. coli*. Bandyopadhyay, 1996, reported that, the active component of turmeric is curcumin, which contains 40% oteoresin. Turmeric and its active component curcumin has antioxidant, anti-inflammatory, antimutagenic, antiseptic and antimicrobial properties. It acts as an inhibitor of carcinogenesis, which may enhance the body's natural defense mechanisms against cancer Koud., 1993.

The aim of this investigation was to study the effect of adding healthy powders [carrot powder , beet root powder ,curcumin powder and wheat grass at jointing stage] to crackers on chemical, rheological properties and sensory evaluation. On the other hand, the effect of these natural additives on blood hemoglobin, blood glucose, cholesterol, total lipids, triglycerides and liver & kidney functions.

MATERIALS AND METHODS

Soft wheat flour 72 % extraction was obtained from Egyptian Millers 6th of October city, soy flour and soy milk were obtained from Soy factory, FTRI., ARC., carrot and Beet root were obtained from Vegetable Research Institute, ARC., wheat grass was laboratory prepared and turmeric powder was purchase from local market.

Cracker preparation

Mix [95 % wheat flour, 5 % soy flour, in addition of separate amounts of (carrot powder to produce orange dough) or (wheat grass powder to produce green dough) or (beet root powder to produce pink dough) or (turmeric powder to produce yellow dough) with 20 gm butter, 25 gm sugar, 2 gm salt, 3 gm baking powder, 3 ml orange flavor and 20-30 ml soy milk instead of water to achieve high nutritional values. Blend

the above ingredients in a dough mixer until the every separate colored smooth dough were obtained. Sheet every piece of colored dough to [2mm] thick and cut into (1.5 x 2.5 Cm) strips. Lift crackers dough on greased baking sheets and bake in preheated oven to 190c until just firm to the touch and golden color at the top of each piece, transfer to cooling rack and leave until cold.

Chemical analysis:

Row materials were analyzed to their main chemical composition according to AACCC 1995. Minerals determin in carrot . wheat grass, beet root and turmeric powders using atomic absorption spectroscopy technique according to A.O.A.C. 1990. Sensory evaluation of crackers taste, flavor, color, texture and overall acceptability were carried out according to Faridi and Rubenthaler 1984.

Biological experimental:

Twenty four male albino adult rats (ranged from 80 to 90 gm) were fed on basal diet including corn starch, casein, corn oil, cellulose, salts mixture and vitamins mixture for one week. Rats were divided into four groups [for each). The first group (group 1) was fed on the basal diet [as control], second and third groups [12 rats) were fasted overnight and injected by Alloxan solution according to Buko et al., 1996 to induce hypercholesterolemia and hyperglycemia , then fed on basal died for 48 hr. after this period tow groups were divided into two subgroups [rats for each], one of them (group 2) was fed on normal diet which, considered as defected group, and the other subgroup (group 3) was fed on healthy crackers [diet). The fourth group (group 4) was fed on healthy diet [of all colored healthy crackers]. During the thirty days (experimental period), rats were weighted every two days with determination of food consumption. Blood samples were collected from four groups, centrifuged to obtained serum, kept in the deep freezer for analysis. The above experimental summarized as follows:

- Group 1 = (control), fed on normal diet.
- Group 2 = (infected control),fed on normal diet.
- Group 3 = (infected control),fed on healthy crackers.
- Group 4 = (fed on healthy crackers).

Blood analytical methods:

Glucose was determined according to Tietz, 1986, serum uric acid and blood urea, were carried out according to Henry, 1974, creatinine according to Schirmeister 1964, Aspartate transaminase enzyme (AST) according to Reitman and Frankel 1957, Alanine transaminase enzyme (ALT) according to Schmidt (1967) triglycerides according to (Fossati and Prencipe, 1982), total lipids Knight et. al, 1972, total cholesterol according to Allain et.al, 1974, Hemoglobin was measured according to Wintrob, 1965.

RESULTS AND DISCUSSION

The chemical composition of raw materials were determined as shown in Table (1). From data presented in this Table, it could be noticed that wheat grass was the highest values of protein, ash, chlorophyll, fiber and calcium. While curcumin was pronounced in iron, potassium and phosphorous. Beet root contains high amount of potassium [365 mg] and fiber [9.33 %]. but it was the lowest amount of iron content [mg]. This finding was agreement with Coulson, 1980.

Table (1) : Chemical composition of row materials.

	Soft Flour	carrot	Wheat grass	Beet rot	curcumin
Protein %	9.5	6.6	24.57	5.36	7.1
Fat %	0.75	0.9	0.9	0.46	10.3
Ash %	0.48	5.8	12.5	5.58	6.2
Chlorophyll mg	-	-	0.53	-	-
Fiber %	0.38	10.0	16.8	9.33	6.1
Iron mg	2.05	8.8	24.86	0.82	39.2
Calcium mg	4.3	17	429	28	174
Potassium mg	0.5	2.24	691	365	2312
Phosphorous mg	158	22	98	54	280
Zinc mg	5.5	0.2	1	0.5	3.6

Data illustrated in Table (2) indicated that addition of blend of carrot powder, dried wheat grass powder, beet root powder and curcumin powder] to soft wheat flour affected on rheological properties of dough.

Water absorption was increased from 54.2 % for control sample [soft wheat flour without additives] to 61.8 % for dough blended with above additives. Dough stability, energy and maximum viscosity were decreased from 2.5 mm, 46 Cm and 620 BU. to 1.5 mm, 27.5 Cm and 580 BU. for stability, energy and maximum viscosity, respectively when blend powders was added. These results due to high fiber and protein content in additives which caused increase water absorption and decreased stability and energy than soft wheat flour.

Table (2) : Rheological properties of dough made from soft wheat flour with blend of natural additives compared with control.

	W.A	Stability	Ratio	Energy	Max viscosity
Control [soft flour]	54.2	2.5	2.7	46	620
soft flour + Additives	61.8	1.5	1.4	27.5	580

- W.A = Water absorption.

Data tabulated in Table (3) declared that the healthy crackers was higher score than control. Increase score in healthy crackers may be due to high fiber content which caused more friable texture than normal crackers (low fiber content)], and presence of different colors in healthy crackers lead to attractive general appearance and high color and flavor scores than control.

Table (3) : Sensory evaluation of control crackers and healthy crackers.

Properties	Score	Control	Healthy crackers
Taste	30	27	28
Texture	20	16	19
Flavor	30	27	29
Color	20	18	19
Overall acceptability	100	88	95

The results indicated in Table (4) showed that there was significant increase in feed intake, body weight and liver weight for (group 4) [rats

fed on healthy crackers] compared with infected rats fed on normal diet (group 2), infected rats fed on healthy crackers (group 3) or rats fed on normal diet (group 1). The liver weight increased with increase of body weight, this increase was more pronounced in infected rats (group 2). These results are in agreement with Wasif and Hussein 1997.

Table (4) : Body weight gain, food intake and food efficiency ratio of rats fed on control and healthy crackers.

Rats groups	Feed intake (g)	Body weight Gain(g)	FER*	Liver Weight(g)
Group 1 [control]	358	64	0.17	5.8
Group 2	311	16	0.11	4.2
Group 3	330	43	0.13	5.1
Group 4	486	94	0.29	7.7

* FER = food Efficiency Ratio.

Table (5) shows that blood glucose, serum uric acid, blood urea and serum creatinine were increased in infected group 2 when compared with control group 1. The healthy crackers caused a significant decrease in blood glucose, serum uric acid, blood urea and serum creatinine contents as compared with other groups. These results are in agreement with Gabr 1998 who found that Alloxan injection caused a highly significant increase in blood glucose, serum uric acid and blood urea relative to the control.

Table (5) Blood serum glucose(mg/dl),Serum uric acid. blood urea (mg/dl) and creatinine (mg/dl) of rats fed on control and healthy crackers.

Rats groups	Blood glucose	Serum uric acid	Blood urea	Serum Creatinine
Group 1 [control]	105	4.22	13.7	0.8
Group 2	388	6.4	26.7	1.9
Group 3	125	4.8	16.8	1.1
Group 4	91	4.25	13.1	0.7

Data illustrated in Table (6) shows that (HB) and (HCT) levels were decreased in (group 2) (infected group fed on normal diet) when compared with control) group 1), while healthy rats (group 4) caused increase of both (HB)and (HCT). In the same Table (AST) and (ALT) levels were increased in infected group when compared with normal control (group No.1). The parameter levels of Infected rats fed on healthy crackers (group 3) ere nearest to normal control data. The (group 4) was more closely to normal parameters.

Table (6) : hemoglobin (g/dl), hematocrit, AST (u/ml) , and ALT (u/ml) alues of rats fed on control and helth crackers.

Rats groups	HB	HCT	AST	ALT
Group 1 [control]	14.2	52.3	28.5	12.0
Group 2	10.8	32.9	50.4	30.8
Group 3	12.6	44.8	33.6	13.2
Group 4	16.3	56.4	28.2	11.9

HB = hemoglobin

HCT = hematocrit

AST = Aspartate transaminase enzyme. ALT = Alanine transminase enzyme.

Table (7) indicated that total cholesterol, total lipids and triglycerides in blood serum decreased in rats fed on healthy crackers (group 4) were increased compared with infected rats which fed on normal diet (group 2), infected rats which fed on healthy crackers (group 3) or rats which fed on normal diet (group 1). This could be attributed to an increase of total fatty acids level in the liver which can be indicator for the increased lipolysis in liver and the increase in hepatic gyptlan phospholiPidS supporting the transport of lipid fraction from the liver to extra hepatic tissue through the plasma in the form of lipoprotein Barakat, 1989.

Table (7) :Total cholesterol, total lipids and triglycerides (g/dl), of rats ded on control and healthy crackers.

Rats groups	Total cholesterol	Total lipids	Triglycerides
Group 1 [control]	153.1	440	130.3
Group 2	412.1	725.4	237.3
Group 3	215.4	516.7	155.6
Group 4	157.6	448	138

Conclusion

Wheat grass was more nutritional values due to it cultivate at 'jointing stage". in this stage, the plant contain over 100 elements. including all the known minerals. Wheat grass is an excellent source of vitamins A, B, C, E and K, as well as calcium, chlorine, iron, magnesium, phosphorus, potassium, sodium, sulfur, cobalt and zinc, Young and Beregi, 1980. It act as a detoxification which increases the elimination of accumulated internal waste which causes disease by auto-intoxication.

Carrot in excellent source of beta — carotene [pro — vitamin A]. Vitamin A is vital for healthy skin and helps form disease resistant mucous membranes, and protection of the lungs and the entire function of the respiratory system. The relation ship between beta-carotene and retinol (vitamin A) is: 6mg of beta-carotene equals 3.333 IU retinol (vitamin A). (the daily requirement is 1.5 mg/day) beta-carotene, it is an antioxidant, which can inhibit excess of oxidation of fats in the cells. it has a specific affinity to an oxygen-derived free radical. (Yeyan-Zhaflg, et al., 1996).

Beet root contained 14 amino acids, nine of which it was able to identify, and which include leucine, tryptophane, valine, alanine, tyrosine, glutamine, and ornithine. Beet root is not rich in iron (0.8 mg), so it will not help to prevent anemia like many people are belief that. Beet root increases the uptake of oxygen by as much as 400 percent. Beet root act as oxyreductase in the cell and thus restore cell respiration and considerably improve the interrupted synthesis of nucleic acid (Coulson, 1980). The high vitamin P content (rutine, a flavon derivative) S very useful in improving the permeability of the cell wall, which possibly is the explanation for the greatly improved cell respiration (about 70%) after administering beet root (Huang, 1995).

Turmeric consists of volatile oils, fixed oils, ash, vitamins and the peptide turmerin. The active component of turmeric is curcumin, which contains 40% oleoresin.

For above nutritional reasons, using a blend of all mentioned natural additives to produce healthy crackers for man, women and specially children to protect them from illness and to get healthy life with healthy crackers. Finally we want to hammer on " treat your self by food not by drugs"

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إضافات طبيعية لمنتجات عالية القيمة الغذائية

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الملخص العربي

إن معظم ما يتناوله الأطفال من الأغذية الخفيفة [Snacks] تتكون أساساً من دقيق الذرة الصفراء أو شرائح (أو دقيق) البطاطس [شيبسي] - وهذه الأغذية ليست ذات قيمة غذائية تتناسب مع الاحتياجات الغذائية المطلوبة .

ولذلك أجريت هذه الدراسة لإنتاج مشابهات لهذه الأغذية الخفيفة في صورة مقرمشات ذات ألوان جذابة لهؤلاء الأطفال مدعمة بإضافات طبيعية مثل مسحوق الجزر الأصفر - مسحوق البنجر - مسحوق الكركم - مسحوق المجموع الخضري لنبات القمح (وهو في طور الاستطالة - Jointing stage) وهو الطور الذي يحتوي فيه النبات على الكلوروفيل والأحماض الأمينية وكثير من العناصر والفيتامينات .

وقد أجريت التحاليل الكيميائية وتأثير هذه الإضافات على الصفات الريولوجية والحسية ، وكذلك التجارب البيولوجية على فئران التجارب - وأظهرت النتائج أن هذه المقرمشات الصحية ذات قيمة غذائية مرتفعة ، وتعمل على خفض الكوليسترول والدهون الثلاثية والدهون الكلية وتحسن من وظائف الكلي وأيضاً رفع نسبة هيموجلوبين الدم .