



EFFECT OF WHEATGRASS AND SPIRULINA AS NUTRITION SUPPLEMENT ON SOME PHYSIOLOGICAL AND BIOCHEMICAL PARAMETERS IN LACTATING FEMALE RATS

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Abstract

The current study was designed to observe and test the spirulina and Wheatgrass in some Physiological and Biochemical parameters in lactating female rats for 21 days. The animals were divided into (3) groups containing five (5) animals and weighing (145-155gm) which ranged in age from 3-4 months. The animals were distributed into four groups, the control group (I), group of spirulina (II) and Wheatgrass group (III). The results were shown when administration the Wheatgrass showed significant increase in ($P < 0.05$) in body weight lactating female rats, Prolactin, cholesterol, protein, albumin, ALP and body weight their pups and no significant ($P > 0.05$) of globulin, ALT and AST compared with the control group. Either when administration the spirulina caused in a significant decrease ($P < 0.05$) of body weight gain, ALT and AST of lactating female rats. And significant increase in ($P < 0.05$) in body weight lactating female rats, Prolactin, cholesterol, protein, albumin, ALP and body weight their pups. And no significant ($P > 0.05$) of globulin compared with the control group. The obtained present results demonstrate that use Wheatgrass and spirulina as nutrition supplementation increase in Prolactin, protein, albumin and body weight their pups. And lowers the aminotransferases in blood, and it's maybe have a beneficial effects on the liver and the health of lactating female rats.

Key words: Wheatgrass, spirulina, Biochemical parameters, lactating female rats.

Introduction

Lactation is a physiological condition known to upregulate the expression of the hypothalamic neurohormones, vasopressin and oxytocin in the rat (Landry *et al.*, 1997), the lactic glands are a unique structure in the lobes.

Spirulina is a plant have microscopic blue-green aquatic and it is the nature's richest and the most complete sources in the organic nutrition. The concentrated nutritional profile of spirulina to arise naturally, so it is ideal for those preferring a whole food supplement to artificial nutrient sources. Spirulina, the blue-green alga, has a unique blend of nutrients that no single source can provide. It contains a wide spectrum of nutrients that include B-complex vitamins, minerals, good quality proteins, gamma-linolenic acid and the super antioxidants,

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beta-carotene, vitamin E and trace elements. Spirulina is fast emerging as a whole answer to the varied demands due to its impressive nutrient composition which can be used for therapeutic uses (Venkataraman, 1998). Spirulina (sometimes called rthospira) is a blue-green cyanobacterium which contains a complex of vitamins (A, B, D, E, K), minerals (calcium, potassium, sodium, magnesium, iron, iodine), amino acids, fatty acids, pigments (phycocyanin, allophycocyanin, chlorophyll and carotenoids), all necessary to an equilibrated diet (Becker, 2004; Spolaore *et al.*, 2006).

Triticum aestivum (Wheatgrass) has high concentrations of chlorophyll, amino acids, minerals, vitamins, and enzymes. Fresh juice has been shown to possess anti-cancer activity, anti-ulcer activity, anti-inflammatory, antioxidant activity, anti-arthritis activity, and blood building activity in Thalassemia. It has been argued that wheat grass helps blood flow, digestion, and

general detoxification of the body due to the presence of biologically active compounds and minerals in it and due to its antioxidant (Chauhan, 2014). Wheat grass, young grass of the common wheat plant, is freshly juiced or dried into powder for animal and human consumption-both the forms provide chlorophyll, 17 amino acid, eight of which are essential minerals, vitamins and enzymes (Walters, 1992). Use wheatgrass herbal system of medicine and described as antioxidant, immunomodulatory, antibacterial, astringent, diuretic, laxative, colitis, acidity and kidney malfunction (Ashok, 2011). And decrease Blood glucose levels and oxidative stress (Jorige and Akula, 2015). Wheatgrass has many characteristics desirable for health. It is known for its healing property. It is used as a cleansing and purifying agent and yet can be considered as a body builder because of its nutritional value. It contains about 70% of chlorophyll which is very much comparable to alfalfa plant. Due to its high chlorophyll content it is also referred as Green Blood (Shaikh and Majaz, 2016). The present study was aimed to a beneficial effects of Wheatgrass and Spirulina as supplementation on some Physiological and Biochemical parameters in lactating female rats and body weight their pups.

Materials and methods

Prepare of experimental samples:

- 1- The dietary supplement spirulina taken from production company DXN.
- 2- Wheatgrass was obtained by planting wheat seeds in the organic fertilizer in ponds dedicated to agriculture. It was sprayed with sufficient water until it was germinated and exposed to light. When the length of the herb was about 10-12 cm it was harvested and dried in a clean place in the shade. The powder was filled in plastic bags and closed for use.

Experimental animals:

This study was conducted on uses laboratory animals which are healthy adult a wistar strain female albino rats, weighing between 145-155 gm, obtained from the animal house of faculty of veterinary medicine, university of Tikrit, Iraq. They were placed under laboratory standard conditions of temperature and humidity, in addition to allowing for 12 hour light-dark cycle. Each animal was placed separately in a metabolic cage, to ensure that food is given accurately according to the specified percentages, a standard pellet diet and water were supplied in adequate amounts *ad libitum* and throughout the performance period of experiments.

Design of Experiments:

The laboratory rats which used in this study (20) animals. They were divided into four (3) groups, with five (5) rats in each group, as follows: The healthy control group (I): supplied only with food and drinking tap water daily for a period (21) days, Spirulinagroup (II): administered Spirulina(40 mg/kg of body wt.) daily for a period (21) days. A wheatgrass group (III): this group had been given Wheatgrass(80 mg/kg of body wt.) daily for a period (21) days.

Finally, after end of the experiment (21) days, the laboratory animals were fasted overnight, then anaesthetized with chloroform, and blood was obtained by jugular vein severance and collected approximately (4) ml from every animal, then put in test tubes devoid of anticoagulant and then it lets in water bath for period (15) minutes at 37°C, after that centrifuged and separate the serum for measuring concentrations of Prolactin, cholesterol, protein total, albumin, globulin, alanine aminotransferase (ALT), aspartate aminotransferase (AST) and alkaline phosphatase (ALP).

The biochemical tests:

The body weights of laboratory animals were determined by a digital balance. While analysis of serum cholesterol, protein total and albumin by using a diagnostic kits which depending on clinical chemistry methods according to the manufacturers recommended procedure from Biolabo, Rondex Laboratories Ltd (Tietz, 2005). In addition, assessment of serum ALT, AST and ALP enzymes by an enzymatic method (Deneke & Rittersdorf, 1984; Deneke *et al.*, 1985; Rosalki, 1993) successively, by using kits supplied from (Roche Diagnostics GmbH, Germany). And Prolactin by using kits supplied from biomerieux inminividas device.

The determination globulin in blood serum according to the following equation (Tietz, 1987).

Concentration of globulin (g/dl) = Total protein Conc. – Albumin Conc.

Statistical analysis:

The data of results in the present study were analyzed by using the ANOVA analysis, utilized the general linear model of the Statistically Analysis System (SAS, 2001). Also, significant differences were evaluated by using Duncan's multiple-range test (Duncan, 1955), and significance level is based on level of probability ($P < 0.05$).

Results and Discussion

Results in table 1 showed that the administration of spirulina and Wheatgrass to the laboratory animal groups

of lactating female rats for 21 days. caused in a significant decrease ($P < 0.05$) of body weight gain of lactating female rats in the group given the spirulina, While observed administrated Wheatgrass a significant increase ($P < 0.05$) of body weight gain for the group given the Wheatgrass

more than the group that was given spirulina compared with the control group.

Whereas the table 2 showed that the significant increase ($P < 0.05$) in pups weights was observed in the

Table 1: Effect of Spirulina and Wheatgrass treatment on lactating female rats weights.

Items	Control	Spirulina	Wheatgrass
1 day (gm)	152.33±0.88 a	147.00±0.57 b	149.00±0.57 b
After 7 days (gm)	151.66±0.88 c	165.33±0.88 b	169.00±1.15 a
After 14 days (gm)	155.00±0.57 c	164.33±0.88 b	174.00±1.15 a
After 21 days (gm)	161.33±0.88 b	150.33±0.88 c	181.33±0.88 a
Weight Gain (gm)	9.00±0.85 b	3.33±0.33 c	32.33±0.66 a

-The values represent mean±Stander Error (S.E.)

-Different of letters horizontally means significant difference at significance level ($P < 0.05$).

Table 2: Effect of Spirulina and Wheatgrass treatment on pups weight.

Items	Control	Spirulina	Wheatgrass
1 day age (gm)	6.83±0.167 b	8.66±0.21 a	5.87±0.12 c
After 7 days (gm)	11.00±0.01 c	14.83±0.16 a	13.75±0.31 b
After 14 days (gm)	16.00±0.01 c	19.83±0.54 a	17.62±0.37 b
After 21 days (gm)	20.00±0.01 c	24.00±0.44 b	26.12±0.44 a
Weight Gain (gm)	13.16±0.167 c	15.33±0.55 b	20.25±0.52 a

-The values represent mean ±S.E.

-Different of letters horizontally means significant difference at significance level ($P < 0.05$).

Table 3: Effect of Spirulina and Wheatgrass treatment on concentrations Prolactin in lactating female rats.

Items	Control	Spirulina	Wheatgrass
Prolactin After 7 days	2.00±0.05 c	3.67±0.04 b	3.88±0.04 a
Prolactin After 21 days	2.55±0.02 c	3.99±0.05 b	4.20±0.02 a

-The values represent mean ±S.E.

-Different of letters horizontally means significant difference at significance level ($P < 0.05$).

Table 4: Effect of Spirulina and Wheatgrass treatment on concentrations of serum cholesterol, proteins, ALT, AST and ALP enzymes in lactating female rats.

Items	Control	Spirulina	Wheatgrass
cholesterol (g/dl)	96±0.57 c	100±1.15 b	110±1.15 a
protein (g/dl)	5.70±0.58 b	6.23±0.08 a	6.60±0.17 a
albumin (g/dl)	2.90±0.58 b	3.70±0.115 a	3.50±0.17 a
globulin (g/dl)	2.80±0.01ab	2.53±0.20 b	3.10±0.17 a
ALP (U/L)	572±5.77 c	878±2.30 a	775±2.88 b
ALT (U/L)	90±1.73 a	71±1.73 b	92±0.57 a
AST (U/L)	218±0.577 a	196±2.309 b	220±5.774 a

-The values represent mean ±S.E.

-Different of letters horizontally means significant difference at significance level ($P < 0.05$).

table when giving Spirulina and Wheatgrass compared to control. Where the Wheatgrass herb group had a significant increase in pups weights more than Spirulina.

Also, a results in table 3 showed that the administration of spirulina and Wheatgrass to the laboratory animal groups of lactating female rats for 21 days. caused in a significant increase ($P < 0.05$) of prolactin of nursing mothers in the group given the spirulina, While observed administrated Wheatgrass a significant increase ($P < 0.05$) of prolactin more than the group that was given spirulina compared with the control group.

Table 4 shows that the administration of spirulina and Wheatgrass to the laboratory animal groups of lactating female rats for 21 days. Resulted in a significant increase ($P < 0.05$) in concentrations of cholesterol, protein, albumin, and ALP and significant decrease in ALT and AST on spirulina group. Whereas observed no significant ($P > 0.05$) of globulin, ALT and AST administration Wheatgrass compared with the control group.

Reason the increase of body weight gain of lactating female rats and body weight their pups maybe to contain Wheatgrass has high concentrations of chlorophyll, amino acids, minerals, vitamins (Chauhan, 2014). And that the use of Wheatgrass may promote the increase of the absorption of the intestines, and strengthens the activity of bacteria, which is among the biologically active probiotics and increase production milk for lactating female rats and increase body weight their pups.

Spirulina tends to make weights within normal levels so they have an effect on diabetes (Layam *et al.*, 2006). In other words, Spirulina improves overall health status and metabolic mechanisms (Abdel- Daim, 2014; Yusuf *et al.*, 2016; Aissaoui *et al.*, 2017).

Increased cholesterol may be due to the synthesis of liver energy due to milk production. Or increased cholesterol in rats during the period of lactation may lead to an increase in liver

metabolism as it adapts to increased food consumption and milk production. And increased prolactin may be due to the healthy nutrition of spirulina and Wheatgrass that affect the growth of hormones that are produced before birth and can affect breast development and thus breastfeeding (kim and park, 2004). And increase of proteins may be due to the content of spirulina on phenolic compounds. These compounds act as free radicals as they play a major role in antioxidant activity and in the oxidation of fat as reported in many studies (Gezer *et al.*, 2006; Turkoglu *et al.*, 2007; Aissaoui *et al.*, 2017). The antioxidants are effective in reducing the effect of oxidative stress and free radicals on albumins, preventing oxidation of proteins and stimulating the activity of antioxidant enzymes such as catalase, which protect cells and tissues from oxidative damage and work to remove free radicals and prevent their proliferation, thereby inhibiting protein oxidation and degradation (Luis *et al.*, 2009; Celik *et al.*, 1999). Increased protein may be due to non-loss of the kidney and its survival within the body, which contributes to weight gain. Thus the phenols present in the wheatgrass could have effectively prevented the cell membrane damage (Datta *et al.*, 2012). And that wheatgrass can effectively protect the liver (Durairaj *et al.*, 2014). The antioxidant activity of wheatgrass was observed at various levels of protection from radical scavenging and inhibition of free radical induced membrane damage (Chauhan, 2014). Decrease enzymes that may be due to produce several of antioxidants, vitamins and minerals in Spirulina which have a removable or neutralize effect for free radicals that can cause oxidative stress and peroxidation of phospholipids in the cell membranes (Gargour *et al.*, 2018) suggests that the addition of spirulina leads to improved enzymes, due to a nephroprotective kidney factor such as phycocyanin (Romay *et al.*, 1999).

Conclusion

In this study suggest that from beneficial applications of Spirulina and Wheatgrass as nutrition supplementation may due to its effects for reducing amelioration of liver functions lactating female rats and body weight their pups.

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