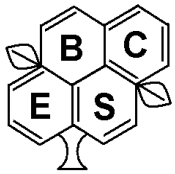

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EFFECT OF SOME DATE PALM PRODUCTS ON HEALTH ASPECT OF AGED RATS

Sherif F. El-Sharabasy[2] ; Sahar A. Arafa [1]and Amany A. Salem[1]

[1]Food and Technology Research Ins., Agriculture Research Centre, Giza.

[2]The Central Laboratory of Date Palm Research and Development- Agricultural Research Center, Giza

ABSTRACT

The present work aimed at testing, in a rat model of elderly nutrition, a local folk medicinal claim that dates are beneficial in human health. The aged rats (male and female) each of them were individual to five groups, control (basal diet), group 1 fed on dibis (10%), group 2 fed on date pits powder (25%), group 3 fed on date palm pollen grain powder (2%) and group 4 fed on whole date fruits (25%). Blood samples which were collected after 45 days of experimental period were analysis serum glucose, lipid profile, liver function and kidney function. Also, the steroid hormones were analyzed for male and female aged rats. The organs weighed after rats killed. The results showed that the date pits powder decreased of lipid profile for male and female aged rats expect triglycerides were increase compared with control group. The aged rats fed on some date palm products showed high levels of ALP compared with control group. Female aged rats fed on date pits powder (25%) and date palm pollen grain powder (2%) resulted in high levels of urea and creatinine. The results showed a decrease in body weight gain in male aged rats and vice versa for female aged rats. The aged rats fed on dibis and whole date fruits showed high liver weight compared with the control group. The male aged rats fed on date pits and whole date fruits showed high level of testosterone. Female aged rats fed on date pits resulted in high level of estradiol. While, female aged rats fed on date pollen grain showed high level of progesterone.

Key words: Date palm, steroid hormones, aged rats.

INTRODUCTION

Adults vary widely in their personal and physical resources to deal with older age. They may have a sense of wholeness and completeness, or they may increasingly withdraw from life. They arrive at older ages as rich persons-rich in wisdom of the years-and enjoy life and health, enriching the lives of those around them. But some elderly people arrive at these years poorly equipped to deal with adjustments of aging and health problems that may arise (Williams, 1992).

Currently there is about a 15% increase in the 65 to 75 –year-old population and a 33% increase in the 75-year-old and older group. The Census Bureau Projects expected that by 2030, one person in every five will be over 65 years old (U.S. Department of Health and Human Services, 1990). In general, during middle and older adulthood there is a gradual loss of functioning cells with reduced cell metabolism. For example, by age 70 the kidneys and lungs lose about 10% of their former weight, the liver loses 18% 0f its weight and skeletal muscle is reduced by 40%. Some of the physical changes of aging affect food patterns (Williams, 1992).

Among nutritional disorders, obesity has received more attention recently; however, under nutrition has disadvantageous effect as well, although it is associated with increaseing morbidity and mortality (Jee *et al.* 2006 and Gombos *et al.* 2008). Under nutrition may cause decrease in the protein synthesis leading to secondary immunodeficiency and to decrease in the level of lipoproteins; thus increasing the susceptibility to infections. It is also associated with reduced muscle strength and impaired wound healing (Alberda *et al.,* 2006 and Gombos *et al.*, 2008). Malnutrition may be associated with impaired quality of life in older adults (Vailas *et al*., 1998 and Gombos *et al.*, 2008).

In western societies the prevalence of under nutrition may reach high level, 20% in elderly but even 37% in nursing homes and hospitals (Guigoz *et al.,* 2002 and Gombos *et al.*, 2008). The assessment of the under nutrition risk of elderly people or of patients with chronic diseases is of great importance; therefore, it should be part of the admission procedure to hospitals. The recognition of the high-risk patients for under nutrition is the base of the appropriate dietary treatment (Gombos *et al.*, 2008).Becase nutrition status be

viewed as a strong determinant of the prognosis and complications of chronic diseases and that impaired health-related quality of life is an important marker of the global health status in the affected individuals, it should be important to investigate possible associations between risk of under nutrition and decreased level of some aspects of health-related quality of life (Gombos *et al.*, 2008).

Dates rich in certain nutrients and provide a good source of rapid energy due to their high carbohydrate content (~ 70 – 80%). Most of the carbohydrates in dates are in the form of fructose and glucose, which are easily absorbed by the human body (Al-Farsi *et al*., 2005 and 2007). Moreover, date fruits are used in the production of local beverage and sprits (Al-Qarawi *et al.*, 2005).

Since ancient times, the date palm has been a significant source of food for both human and livestock. Date pits are by-product of date processing; it is known that the average weight of date pits ranges from 13% to 15% of the date's weight (Hussein *et al.*, 1998 and Aldhaheri *et al.*, 2004). Crude protein, crude fat, crude fiber and ash range 5-7%, 4-10%, 12-27% and 1-2%, respectively. Also, it contains 55-73.7% nitrogen-free extract (NFE) (Hussein *et al.*, 1998 and Ali *et al.*, 1999). Estrogens have been found to occur naturally in such plants as licorice, French bean, date palm and pomegranate (Dean *et al.*, 1971 and Tong *et al.*, 2006). A few workers have reported isolating estrone form date palm (Amin *et al.*, 1969 and Tong *et al.*, 2006), commercial edible oils (Amin and Bassiouny, 1979 and Tong *et al.*, 2006). Many researchers have proposed that date pits have an estrogen-like substance which acts as phytoestrogen in the body of animals fed date pits (Ali *et al.*, 1999 and Aldhaheri *et al.*, 2004).

Pollen has been applied for centuries in traditional medicine, as well as in food diets and supplementary nutrients, due to its high nutrition and physiological properties (Farag *et al.*, 2006). The pollen grain of date palm have been used in Egyptian local practices to improve fertility in women, and in some locations in Arabia date pits are roasted and used in lieu of coffee as a hot beverage (Al-Qarawi *et al.*, 2005). Relatively few phamacological studies have been conducted on dates. For example, it has been shown that, depending on the type of extract used, date fruit and pit extracts significantly increase or decrease gastrointestinal transit (GIT)in mice ((Al-Qarawi *et al.*, 2005&2003), and that date fruit extract has strong antioxidant and antimutagenic properties (Vayalil, 2002 and Al-Qarawi *et al.*,

2005). Date palm kernels have been show to exhibit antiaging properties and significant reduction inwomen (Bauza, 2002 and Al-Qarawi *et al.*, 2005) and natural fats from date palm has beenreported to prevent irritant contact dermatitis (Schliemann-Willers *et al.*, 2002 and Al-Qarawi *et al.*, 2005)

The goal of the present study was to deal with the following points (1) comparison between the levels of blood components of male and female elderly rats. (2) effect of diet supplement with some date products on some biochemical measurements, such as serum total lipids, total cholesterol, high-density lipoproteins, liver and kidney function and steroid hormones of male and female elderly rats

MATERIALS AND METHODS

Materials:

Mature and semi dried date fruits *(phoenix dactylifera)* were obtained from the local market in Giza, Egypt. The date palm pollen grains were purchased The Central Laboratory of Date Palm Research and Development- Agricultural Research Center, Giza, Egypt. The date pollen grains were cleaned from dust, air-dried, finely ground and kept in a refrigerator (5˚C) till use. Date pits (as a waste) were purchased from Jam Factory, pilot plant, Food Technology Research Institute, Agricultural Research Center, Giza, Egypt. Date pits were milled in a heavy-duty grinder to pass 1.2-mm screens and kept in a refrigerator (5˚C) till use. The dibis was prepared by according to the method described by Arafa et al., (2006).

Animals:

The 30 Sprague-Dawley male elderly rats and 30 Sprague-Dawley female elderly rats were purchased from the Laboratory Animal Department, Research Institute of Ophthalmology, Giza, Egypt. They were housed in plastic cages and fed on basal diet, and provided ad libitum for 1 week as an adaptation period. The animal room was maintained at (22˚C ± 2˚C) with timed lighting on from 7 Am to 19 Pm and relative air humidity of 40% to 60%. The initial weights of rats were ≥ 350 g and ≥ 250 g for male and female rats, respectively. In other hand, the rats were aged more 24 months.

Basal diet:

The basal diet consisted of casein (12%) protein ≥85%, wood cellulose (5%), vitamin mixture (1%), salt mixture (4%) and corn oil (5%). The ingredients of the basal diet were completed to 100 g with corn starch. The basal diet formulation was performed according to Reeves et al., (1993).

Nutritional experiments:

Thirty male elderly and also female elderly rats were used in the nutritional experiments. After the adaptation period (1 week), the male rats were randomly divided into 5 groups, each consisting of 6 rats. The first group was fed on the basal diet and considered as a control group. Group 2 was fed on (90%) basal diet with replaced (10%) by dibis. Group 3 was fed on (75%) basal diet with replaced (25%) by date pits powder. Group 4 was fed on (98%) basal diet with supplemented by (2%) of date palm pollen grains powder. Group 5 was fed on (75%) basal diet with supplemented by (25%) of date fruits.

Blood sampling:

At the end of experiment the blood samples were obtained from the orbital venous plexus by means of fine capillary glass tubes according to Farag *et al.*, (2006). Each sample was allowed to clot for 1 min at 5˚C, centrifuged at 1500 rpm for 15 min, and the supernatant serum was kept frozen (- 10˚C) until analysis.

Biochemical assays:

Serum glucose was estimated by oxidase method of (Bahram and Trinder, 1972) and total cholesterol by the method of (Rifai *et al.,* 1999). Serum total lipid and high-density lipoproteins were measured by (Frings and Dunn, 1970) and (Assmann, 1979), respectively. Serum uear was assayed by the method of (Tomas, 1998a) and serum creatinine was estimated by the method of (Tomas, 1998b). Serum AST and ALT were assayed by the method of (Moss and Henderson, 1999). Serum alkaline phosphatase was determined according to the method described by (Deutschen, 1972).Testosterone, estradial and progesterone as steroid hormones were determined as reported by Wisdom(1976), Siiteri et al.,(1982) and Tietz(1995).

Organs preparation:

Liver, kidney, heart, spleen and pancreas tissues were removed, rinsed in cold saline, blotted, weight and used for histological analysis. The organs were kept in formalin (10%) solution for histological analysis according to the method described by (Yoon *et al.*, 2001).

Statistical analysis:

The standard analysis of variance procedure of the factorials experiments in a completely randomized desing was applied for the present data as reported by Cochran and Cox, (1992). Least significont difference (LSD) test at 5% levels of probability was used to compare the mean values of all experiments.

RESULTS AND DISCUSSION

Table (1) shows that the effect of feeding on basal diet contained dibis (10%), date pits powder (25%), date palm pollen grain powder (2%) and whole date fruits (25%) on serum glucose, lipid profile, some liver and kidney functions. Generally, the data revealed that the male aged rats showed higher than female aged rats fed on the same diet for biochemical tests. And, all biochemical tests were in the normal range for male and female rats expect AST and ALT which were a lower than normal ranges. These results are agree with **Archer *et al.*,(1977)** who reported the normal of some parameters for blood contents for rats.

On the contrary, total lipids and high denisty lpoproteins (HDL)for male resulted in a highly significant decrease compared with control expect that male aged fed on date pollen grain (2%) which resulted in a highly significant increase compared with control. The data in table (1) showed that increasing in triglycerides for male aged rats fed on some date products. Meanwhile, the female aged rats showed some fluctuation in all parameters. The results showed that the female aged rats fed on dibis (10%) and date pits (25%) resulted in highly significant increase in total cholesterol, triglycerides and total lipids. Moreover, the female aged rats fed on date palm pollen grain powder (2%) and whole date fruits (25%) showed highly significant decrease serum total cholesterol, HDL and total lipids.

Table (1): Effect of some date products on some serum biochemical parameters of aged rats:

parameter	Control	Group I	Group II	Group III	Group IV	L.S.D $_{0.05}$
Male: ---------- Glucose (mg/dl)	90.46±5.05^{ab}	80.43±1.98^{a}	95.82±1.61^{b}	91.19±4.04^{ab}	112.18±4.30^{c}	40.033
Total cholesterol (mg/dl)	117.5±4.33^{ab}	112.50±1.44^{a}	127.50±1.44^{bc}	130.00±5.77^{c}	112.50±1.44^{a}	5.05
Triglycerides (mg/dl)	108.33±4.41^{a}	130.00±0.00^{a}	115.00±2.89^{b}	161.67±16.9^{b}	110.00±2.89^{a}	11.88
HDL(mg/dl)	42.67±0.67^{b}	39.50±0.29^{ab}	41.50±202^{ab}	38.50±1.44^{a}	39.00±0.58^{ab}	1.75
Total lipid(mg/dl)	413.33±57.3^{a}	375.00±5.77^{a}	382.50±4.33^{a}	424.00±12.1^{a}	347.50±1.44^{a}	39.07
AST(IU/L)	34.67±5.24^{a}	22.50±2.02^{bc}	25.50±1.44^{b}	19.00±0.58^{bc}	14.00±1.16^{c}	3.93
ALT(IU/L)	24.17±3.37^{b}	15.50±0.29^{b}	14.00±0.58^{b}	15.50±2.60^{b}	12.50±0.89^{b}	2.85
ALP(IU/L)	95.0±8.66^{a}	112.50±1.44^{ab}	130.00±5.77^{b}	130.00±2.89^{b}	177.50±10.1^{c}	9.83
Urea (mg/dl)	41.5±0.87^{b}	51.00±2.89^{c}	40.50±0.87^{b}	45.00±2.89^{bc}	34.00±1.16^{a}	2.92
creatinine(mg/dl)	0.36±0.026^{ab}	0.46±0.04^{c}	0.41±0.003^{bc}	0.47±0.05^{a}	0.30±0.00^{a}	0.047
Female: ---------- Glucose (mg/dl)	98.04±6.83^{ab}	98.63±2.40^{ab}	114.04±4.55^{b}	94.04±4.75^{a}	109.90±8.13^{ab}	97.06
Total cholesterol (mg/dl)	117.50±1.44^{c}	122.50±4.33^{c}	120.00±2.89^{c}	102.50±1.44^{b}	92.50±1.44^{a}	3.82
Triglycerides (mg/dl)	102.5±4.33^{a}	110.00±2.89^{ab}	114.00±2.08^{b}	102.50±1.44^{a}	104.83±1.30^{a}	3.93
HDL(mg/dl)	39.50±0.29^{c}	38.67±1.76^{bc}	38.33±1.20^{bc}	36.00±0.58^{ab}	33.00±0.08^{a}	1.52
Total lipid(mg/dl)	350.0±5.77^{c}	367.50±7.22^{d}	365.00±5.77^{cd}	325.00±2.89^{b}	305.00±2.89^{a}	7.70
AST(IU/L)	23.50±1.44^{a}	23.00±1.73^{a}	24.50±0.87^{a}	25.50±0.29^{a}	22.50±2.02^{a}	2.09
ALT(IU/L)	15.50±0.87^{c}	16.00±0.58^{bc}	18.00±0.58^{ab}	15.50±0.29^{c}	19.50±0.87^{a}	0.99
ALP(IU/L)	70.00±2.89^{a}	145.00±14.4^{c}	162.50±4.33^{c}	85.83±4.64^{ab}	101.67±4.41^{b}	10.99
Urea (mg/dl)	32.17±1.17^{a}	35.50±2.02^{ab}	40.50±0.87^{c}	39.00±0.58^{bc}	32.50±0.87^{a}	1.79
creatinine(mg/dl)	0.30±0.006^{a}	0.29±0.006^{a}	0.32±0.009^{a}	0.38±0.011^{b}	0.30±0.006^{a}	0.011

Each value in a column followed by the same letter are not significantly different at p=0.05.

Some liver functions (AST, ALT and ALP) resulted in decreasing in AST and ALT and, increasing in ALP for male aged rats. While, the results showed almost the some results between groups for AST and ALT and, increasing in ALP for female aged rats. There are high significant differences between groups regarding liver functions. Kidney function (urea and creatinine) resulted in a highly decrease concernens in group fed on whole date fruits for male aged rats and, meanwhile, female aged rats fed on date pits and date palm pollen grain showed highly increase. These results agree with Farag *et al.*, (2006) who found that decrease in total cholesterol but, disagree with them about increasing in HDL and total lipids for elderly female rats fed on mixed bee-pollen (2%).

Table (2): Total body weight gain loss and organs weight of aged rats (g) as affected by dietary treatments:

parameter	Control	Group I	Group II	Group III	Group IV	L.S.D $_{0.05}$
Male: ---------- Body weight gain (g)	-45.83±5.49^{ab}	-39.50±0.29^{a}	-61.50±3.02^{cd}	-70.00±2.6788^{cd}	-55.00±3.22^{bc}	4.818
Heart (g)	o.95±0.029^{a}	1.05±0.087^{ab}	0.85±0.029^{a}	1.30±0.116^{b}	1.00±0.116^{a}	0.125
Kidney (g)	1.70±0.116^{a}	2.40±0.173^{b}	1.65±0.087^{a}	2.00±0.116^{a}	1.70±0.116^{a}	0.184
Liver (g)	8.30±0.116^{ab}	10.05±0.37^{c}	8.15±0.202^{ab}	7.93±0.203^{a}	9.35±0.722^{bc}	0.576
Spleen (g)	0.90±0.058^{a}	0.95±0.087^{a}	0.65±0.029^{a}	0.90±0.116^{a}	0.70±0.116^{a}	0.130
Pancreas (g)	0.95±0.087^{a}	1.15±0.144^{a}	1.05±0.26^{a}	1.30±0.116^{a}	1.00±0.058^{a}	0.222
Lung (g)	2.17±0.145^{ab}	2.05±0.087^{ab}	1.60±0.231^{a}	3.33±0.186^{c}	2.35±0.318^{b}	0.308
Female: ---------- Body weight gain (g)	42.00±4.163^{a}	30.67±2.85^{b}	-9.67±2.33^{c}	5.33±2.028^{c}	32.33±3.93^{ab}	4.699
Heart (g)	0.73±0.033^{ab}	0.70±0.058^{ab}	0.60±0.058^{a}	0.83±0.067^{b}	0.70±0.058^{ab}	0.082
Kidney (g)	1.33±0.145^{a}	1.43±0.240^{a}	1.00±0.100^{a}	1.13±0.033^{a}	1.23±0.088^{a}	0.207
Liver (g)	5.71±0.208^{ab}	6.27±0.384^{a}	4.80±0.100^{b}	5.90±0.400^{a}	5.87±0.384^{a}	0.472
Spleen (g)	0.60±0.058^{a}	0.63±0.033^{a}	0.50±0.058^{a}	0.60±0.00^{a}	0.80±0.351^{a}	0.240
Pancreas (g)	1.67±0.120^{b}	1.47±0.120^{b}	0.80±0.100^{a}	0.73±0.133^{a}	1.63±0.318^{b}	0.263
Lung (g)	1.70±0.116^{bc}	1.43±0.067^{ab}	1.22±0.101^{a}	1.70±0.100^{bc}	1.90±0.058^{c}	0.135

Each value in a column followed by the same letter are not significantly different at p=0.05.

Table (2) showed a weight gain some organs weight of aged rats (male and female) fed on some date products at the end of experimental period. Generally, the results showed that the male aged rats were decrease in body weight gain. The male aged rats resulted in loss weight -10.0%, -15.61%, -17.83% and -14.46% for groups fed on dibis, date pits, date palm pollen grain and whole date fruits, respectively compared with control. While, the female aged rats was increase in body weight gain. The female aged rats resulted in weight gain by about 14.6%, 1.86% and 16.48% for groups fed on aforementioned diets expcet -4.55% loss in body weight gain of female aged rats fed on date pits compared with control. There is a high significant differences between groups compared with control.

Heart, kidney, spleen and pancreas resulted in non-significant differences between treatment groups compared with control for aged rats. Meanwhile, liver weight for male aged rats showed a significant increase due to feeding dibis and whole date fruits. Moreover, lung showed that a significant increase due to date pollen grain and whole date fruits for male aged rats and whole date fruits for female aged rats but, showed a significant decrease as result of feeding dibis (10%) and date pits (25%) compared with control (basal diet).

Table (3): Steroid hormones for aged rats fed on some date products:

Steroid hormones	Control	Group I	Group II	Group III	Group IV	L.S.D 0.05
Male: ---------- Testosterone	2.82±0.06[b]	2.9±0.029[b]	3.3±0.029[a]	3.2±0.029[a]	3.3±0.029[a]	0.055
Female: ---------- Estradiol	40.03±3.49[a]	37.17±1.17[a]	42.00±3.46[a]	36.13±2.15[a]	36.83±3.62[a]	4.35
progesterone	16.28±1.16[a]	16.3±1.21[a]	16.36±0.63[a]	17.4±1.62[a]	15.32±1.74[a]	1.967

Each value in a column followed by the same letter are not significantly different at p=0.05.

Table (3) showed that the steroid hormones levels for aged rats fed on some date products. The data resulted in increase in testosterone level for all male groups fed on some date products compared with control. The major increase was found due to date pits

and whole date fruits. This result is agree with that (Aldhaheri *et al.,* 2004) who found that testosterone levels in rats given the date pits (25%) had a higher than the control but, it does not agree with (Ali *et al.*, 1999) who found that testosterone levels in rats given date pits, at levels of 7% and 14% in feed, were about 3 and 5 times that of the control, respectively.

However, the estradiol concentration in the serum of female aged rats fed on dibis (10%), date palm pollen grain (2%) and whole date fruits (25%) decreased ($p<0.05$) but, the female aged rats fed on date pits (25%) showed increase in serum estradiol level compared with control rats. The hormone level was not significantly affected when the rats were treated with some date products. This result does not agree with that Aldhaheri *et al.,* (2004) and Ali *et al.*,(1999) who found that the estradiol concentration in the serum of rats significantly decrease ($p<0.05$) as the percentage of date pits increased.

Progesterone is one of the hormones, responsible for fertility. The data indicated that the fed on some date products to female aged rats increased their fertility expect the whole date fruits show decrease in progesterone level. This result is agree with that (Farag *et al.*, 2006) who found that the elderly female rats administration of mixed bee-pollen higher than control for progesterone level. This result due to date pits, date pits have an estrogen-like substance which acts as a phytoestrogen in body of animals fed date pits (Elgasim *et al.*, 1995; Ali *et al.*, 1999 and Aldhaheri *et al.,* 2004).

From the above mentioned data, it could be concluded that date pits affected the serum lipid profile, some liver function and steroid hormones due to its higher amounts of fiber and some substance such as glycosides, minerals, isoflavons …etc affected the enzymes or hormones responsible for metabolism system. Date pollen grain rich in hormones and this may be the active material which affected the steroid hormones in the body and paralled some hormones.

Conclusion:

The present study suggests that more studies should be taken into comideration on date by-products as a food function to maintain health.

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تأثير التغذية ببعض منتجات نخيل البلح على تحسين صحة الفئران المسنة

د.شريف فتحى الشرباصى[2] - د. سحر أحمد عرفة[1]-د. أمانى عبد الفتاح سالم[1]

[1] معهد بحوث تكنولوجيا الأغذية –مركز البحوث الزراعية.
[2] المعمل المركزى لبحوث النخيل – مركز البحوث الزراعية.

تهدف هذه الدراسة لاختبار تغذية المسنين مستخدمة فئران مسنة حيث يقال فى الطب الشعبى أن للبلح فوائد كثيرة لصحة الأنسان تم اختيار فئران مسنة (ذكور و أناث) و قسمت هذه الفئران الى خمس مجموعات منها مجموعة حاكمة ثم المجموعة الأولى تم تغديتها على عسل البلح (10%) و الثانية على نوى البلح المطحون، (25%) و الثالثة على طلع النخيل المطحون (2%)، و الرابعة على ثمار كاملة (25%). كما تم تجميع عينات الدم بعد 45 يوم و تقدير سكر الدم و صورة الدهون و بعض وظائف الكبد و الكلى و كذلك الهرمونات الاستريدية و أيضا تشريح الفئران. و قد أوضحت النتائج الاتى :اضافة نوى البلح أدى الى خفض صورة الدهون للذكور و الأناث عدا الجليسريدات الثلاثية التى زادت بالمقارنة بالمجموعة الحاكمة. كما زادت التغذية على بعض منتجات نخيل البلح الى زيادة فى انزيم الاكلين فوسفاتيزبالمقارنة بالمجموعة الحاكمة. كما ان التغذية بنوى البلح و طلع النخيل زاد من اليوريا و الكرياتينين. أيضا أوضحت النتائج انخفاض فى وزن الجسم بالنسبة للذكور و زيادة فى وزن جسم الأناث. كما لوحظ زيادة فى وزن الكبد للحيوانات المسنة و المغذاه على عسل البلح و الثمار الكاملة عند المقارنة بالمجموعة الحاكمة. بالنسبة للهرمونات الاستريدية وجد أن الذكور المغذاه على نوى البلح و الثمار الكاملة أعطت أعلى مستوى من هرمون التستستيرون ،كما أن تغذية الأناث بنوى البلح زاد من هرمون الاستراديول،كما أن التغذية على طلع النخيل زاد من هرمون البيروجسترون.