

Study the effect of adding *Cuminum cyminum* seeds in the diet on semen characteristics and hormones level in serum of local bucks

Sadeq jaafer Zalzal

Department of Surgery and Obstetrics, College of Veterinary Medicine, Baghdad University, Iraq.

E-mail: sadeq.jaffar1@gmail.com

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Summary

This study was conducted on sixteen local Iraqi bucks aged 3 to 4 in College of Veterinary Medicine/ University of Baghdad from January to May, 2016. They were divided randomly into two equal groups; 1st group (G1) was treated by oral administration of 15 gm/daily cumin seeds for 3 weeks, while the 2nd group (G2) represented control group. The 1st group showed a significant ($P \leq 0.05$) increase in semen volume (2.08 ± 0.36 ml); furthermore, the number of sperms increased significantly also according to assessment of semen color (4.23 ± 0.26). Mass and individual motility showed significant higher level in the 1st group (86.00 ± 1.97 , $87.00 \pm 1.62\%$, respectively), than in the control group. Significant increase in cortisol and testosterone level was recorded in the 1st group as compared with the 2nd group. In conclusion, cumin seeds enhanced improvement of semen bucks quality.

Keywords: *Cuminum cyminum*, buck, Semen, Cortisol hormone, Testosterone hormone.

Introduction

Goat, are considered one of small ruminants whose meat and milk can be used in human food, few studies made on male goats as compared with bovine and ovine in Iraq related with using medical plants for reproduce improvement (1 and 2). Herbal medicine is an important part of modern medicine, it is based on the use of plants and their extracts, *Cuminum cyminum* is an aromatic, astringent herb, it is considered as one of the medical and nutritional sources because of its properties (3). *Cuminum cyminum* contains various chemical components, the main components are flavonoids by which cumin characterized by the antioxidant activity (4 and 5). Cumin seeds, oil and fruit are all used because of their nutritional value which contains protein, carbohydrate, vitamins and minerals (6 and 7). After puberty there were significant rise in SSH and ICSH level and this controversially before puberty (8). A correlation between testosterone hormone and testes size at puberty age were reported (9). While adding cumin seeds caused an increase in the testosterone level, size and weights of testes, improving in semen quality and sexual behavior (10).

There were link between better nutrition and higher sperm producing parenchyma in the testes of animals (11). The effect of adding parsley seeds and vitamin E on the reproduction trait of Karadi ram lambs, as feed

additive caused an enhancement, and shortening the age of puberty (9). Many workers found that adding different medical plants (*Zingiber officinale*, *Eruca sativa* and *Nigella sativa*) enhances the puberty (12 and 13). The aim of this study was to evaluate the effect of using cumin seeds daily feeding of local bucks on semen properties and concentrations of testosterone and cortisol.

Materials and Methods

This study was conducted on 16 local Iraqi bucks aged between 3 – 4 years in the Animal Farm/ College of Veterinary Medicine/ Baghdad University. From January to May 2016 animals were fed on hay, bran and concentrated diet. Animals were divided into two equal groups randomly according to the type of treatment; G1 treated with 15 gm cumin seeds/ buck orally for 3 weeks daily, the G2 represented control group.

Semen samples were collected by using artificial vagina (A.V.) before and after treatment at intervals 3 weeks, bucks semen quality were examined for physical traits including semen ejaculation volume (ml), (14), color (15), sperms concentration in addition to individual and mass motility (14). The color of semen was recorded immediately by naked eye and the color was assessed (15), Table (1).

Table, 1: The color of semen according to Evan and Maxwell (1987).

Score	Consistency	No. of sperm (10 ⁹)/ml	
		Mean	Range
5	Thick creamy	5.0	4.5-6.0
4	Creamy	4.0	3.5-4.5
3	Thin creamy	3.0	2.5-3.5
2	Milky	2.0	1-2.5
1	Cloudy	1.0	0.3-1.0
0	Clear watery	Insignificant	Insignificant

Serum levels of cortisol and testosterone hormones before and after treatment were examined by using specific kits and gamma counter by Alnadaer Clinical Laboratory in radioimmunoassay (RIA) (16). T. test and F. test were used for Statistical analyses (17).

Results and Discussion

This was the first trial done on bucks, so there are no available related researches. Results showed a significant ($P \leq 0.05$) increase in semen volume (2.08 ± 0.36 ml); color (4.23 ± 0.26) in the treated group (Table, 2). Also in sperm concentration ($4.14 \pm 0.12 \times 10^9$ / ml) (Table, 3) and mass and individual motility (86.00 ± 1.97 and 87.00 ± 1.62 %), (Table, 4). Cumin seeds contain flavonoids which have antioxidant activity that stimulate antioxidant system which have similarity to the chemical structure of sex hormone earned some isoflavonoids androgenic effects in mammals (18). Besides, cumin seeds act as stimulant to the sexual organs and libido in both male and female (19). In addition, cumin seeds are rich in vitamin E (20), which has a vital effect to stimulate the pituitary gland to produce interstitial cell stimulated hormone (ICSH), then causing an increase in the testosterone production that is in turn affecting the volume and number of spermatozoa. The high individual and mass motilities in G1 might be belonged to the minerals present in *Cuminum cyminum* as iron, calcium and phosphorus as well as its content of vitamins such as thiamin, riboflavin and niacin (20). Calcium plays an important role in inhibition of phosphodiesterase enzyme, which lessens the concentration of cAMP responsible for activation of sperm motility (21). The same results were observed by using *Zingiber officinale* (22) and using *Eruca sativa* (23). The decrease in the percentages of dead sperms in the treated

group might be due to its content of flavonoids and vitamin E. (24) showed similar trend using *Zingiber officinale*.

Table, 2: Effect of cumin seeds on volume (ml) and color of semen for local Iraqi bucks (M ±SE).

Groups	No. of Animals	Volume		Color	
		Pre Treat. (ml)	Post Treat. (ml)	Pre Treat.	Post Treat.
G1	8	1.62	2.08	2.98	4.23
		± 0.45	± 0.36	± 0.58	± 0.26
G2	8	a	b	A	B
		1.58	1.45	3.07	3.15
		± 0.57	± 0.76	± 0.27	± 0.34
		a	a	A	A

*Different small letters mean sig. difference $P < 0.05$

*Different capital letters mean sig. difference $P < 0.05$

Table, 3: Effect of cumin seeds on sperm concentration. (M ±SE).

Groups	No. of Animals	pre treatment ($\times 10^9$ /ml)	Post treatment ($\times 10^9$ /ml)
G1	8	3.24 ± 0.26	4.14 ± 0.12
		a	b
G2	8	3.15 ± 0.22	3.17 ± 0.34
		a	a

*Different letters mean sig. difference at $P < 0.05$.

Results showed a significant ($P \leq 0.05$) elevation in cortisol level in G1 (13.22 ± 1.82 nmol/ ml), and in testosterone level (4.72 ± 0.42 nmol/ ml) in comparison with G2 Post treatment (Table, 5). Cortisol is synthesized in the adrenal cortex, and its production is stimulated by physical stress, emotional and psychological (25). The increase in cortisol level in G1 might be owing to cumin seeds as it stimulates the hypothalamus pituitary adrenal system resulting in adrenocorticotrophic hormone secretion (ACTH) that stimulates adrenal gland to secrete glucocorticoid from the adrenal cortex. The high level of testosterone in G1 might be due to that cumin acts as a stimulant to the sexual organs and libido in both male and female due to its containing vitamin E (19 and 26) beside to its antioxidant activity that increase levels of tRNA and mRNA for synthesis of leydig cells for the hormone (27) also the flavonoids affect leydig cell to produce testosterone hormone (20 and 28). In conclusion, cumin seeds in diet of Iraqi bucks improve the semen characteristics (volume, color, concentration and motility) as well as elevates testosterone and cortisol values.

Table 4: Effect of cumin seeds on mass and individual motility of sperm. (M ±SE)

Groups	No. of Animals	Mass motility		Individual motility			
		Pre treatment %	Post treatment %	I	Pre treatment %	Post treatment %	I
G1	8	77.00±1.76 a	86.00±1.97 b	0.57	80.00±1.54 a	87.00±1.62 b	0.48
G2	8	76.00±1.65 a	78.00±1.53 a	0.42	79.00±1.63 a	81.00±1.35 a	0.58

*Different small letters mean sig. difference at P<0.05.

Table 5: Effect of cumin seeds on serum cortisol and testosterone hormones level. (M ±SE).

Groups	No. of Animals	Cortisol		Testosterone			
		Pre treatment nmol/ml	Post treatment nmol/ml	I	Pre treatment nmol/ml	Post treatment nmol/ml	I
G1	8	7.46±0.19 a	13.22±1.82 b	1.02	3.47±0.16 a	4.72±0.42 b	0.13
G2	8	8.23±0.26 a	8.79±0.38 a	0.40	3.25±0.27 a	3.56±0.13 a	0.36

*Different small letters mean sig. difference P< 0.05

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دراسة تأثير إضافة بذور الكمون إلى عليقة ذكور المعز المحلي في صفات السائل المنوي ومستوى هورموني

الكورتيزول والشحمون الخصوي في مص الدم

صادق جعفر زلزلة

فرع الجراحة والتوليد، كلية الطب البيطري، جامعة بغداد، العراق.

E-mail: sadeq.jaffar1@gmail.com

الخلاصة

أجريت الدراسة في كلية الطب البيطري للمدة من كانون الثاني وحتى مايس عام 2016 واستعمل في هذه الدراسة 16 من الجداء المحلية قسمت عشوائياً إلى مجموعتين: المجموعة الأولى عوملت بإعطائها 15 غم/يومياً من بذور الكمون للجدي الواحد عن طريق الفم لمدة ثلاثة أسابيع، والمجموعة الثانية كانت مجموعة سيطرة. أظهرت النتائج ارتفاعاً معنوياً ($P \leq 0.05$) في صفات السائل المنوي للمجموعة المعاملة في الحجم، (2.08±0.36 ml) واللون (4.23±0.26) وكذلك في تركيز النطف (4.14±0.12×10⁹/ml) والحركة الجماعية والفردية (87.00±1.62%)، (86.00±1.97%). كذلك أظهرت النتائج ارتفاعاً معنوياً في مستويات هورموني الكورتيزول (13.22±1.82 nmol/ml) والشحمون الخصوي (4.72±0.42 nmol/ml) في مص الدم في المجموعة الأولى مقارنة بالمجموعة الثانية. يستنتج من هذه الدراسة أن إضافة بذور الكمون لغذاء الجداء المحلية يؤدي إلى تحسين صفات السائل المنوي (الحجم واللون والتركيز والحركة) وتحسين مستويات هورموني الشحمون الخصوي والكورتيزول في مص الدم لهذه الحيوانات.

الكلمات المفتاحية: بذور الكمون، الجدي، السائل المنوي، هورمون الكورتيزول، الشحمون الخصوي.