



## The Role of Sex Chromatin Figures on some Biochemical Constituents of Blood and Milk in Local She-Camels (*Camelus dromedaries*)

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**Abstract** | This study was designed to determine the roles of sex chromatin in relation to some blood and milk constituents of she camel (*Camelus dromedaries*). Blood and milk samples were collected from 30 adult dairy, 5-10 years old she camel at Al Muthanna province during the period from August 2017 to February 2018. The samples were sent to the laboratory of college of veterinary medicine/ Kerbala University for analysis. The percentages of sex chromatin types including Drum stick, Sessile nodule, small club and Tear drop were 59.95%, 25.20%, 8.53%, and 6.31% respectively. The means of horizontal and vertical dimension and sex chromatin areas were  $1.150 \pm 0.04 \mu\text{m}$ ,  $1.115 \pm 0.04 \mu\text{m}$  and  $0.986 \pm 0.07 \mu\text{m}^2$  respectively. While, the average  $\pm$  standard error of horizontal and vertical dimension and nucleus area were  $11.55 \pm 0.29 \mu\text{m}$ ,  $11.12 \pm 0.30 \mu\text{m}$  and  $101.40 \pm 4.76 \mu\text{m}^2$  respectively. Moreover, the sexual chromatin area / nucleus area and the number of lobes in the nucleus were  $1.061 \pm 0.07\%$  and  $3.82 \pm 0.14$  respectively. The blood glucose, total protein, total cholesterol, and total triglyceride means were  $118.89 \pm 2.74 \text{ mg / dL}$ ,  $7.61 \pm 0.18 \text{ g/dL}$  and  $70.80 \pm 2.14 \text{ mg/dl}$  and  $55.28 \pm 1.27 \text{ mg/dl}$ , respectively. However, the lipid, protein, lactose and non-lipid solid materials means of the milk were  $3.40 \pm 0.11$  and  $3.60 \pm 0.10$  and  $4.8 \pm 0.12$  and  $11.25 \pm 0.17\%$  respectively. A significant variations were appeared between different parameters of blood and milk constituents in relation to the types of sex chromatin. In conclusion, this study approved the possibility for using sex chromatin in rapid selection programs to improve the genetic properties in the local Iraqi camels population.

**Keywords** | Camelids, Sex chromatin, Blood, Milk

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### INTRODUCTION

Camels are among the animals that mentioned in the Quran as a God miracle (Deuraseh, 2005). Arabian camels are the important component of arid and semiarid ecosystem. Camels have economic importance for the Bedouins and also are considered as a source of milk, hid and meat (Yagil, 2000). The scientist give attention to the camel breeding, moreover they implemented a new technologies to improve the camelids breeding and its genetic characteristic and to overcome the cases of non-fertilization (Zeidan et al., 2011). Globally, there are approximately 23.9 million head according to the statistics of the World Food and Agriculture Organization. Camels belongs to *Camelus* species that are classified into two genus the *Camelus dromedaries* and *Camelus bactrianus* (Wardeh,

2004). Chromosomes are genetic structures within the cell nucleus that are responsible for transmitting genes from parents to offspring in the form of genes, the basic unit of one sex chromatin (Al-Issawi et al. 2013). The presence of chromatin materials in some body cells of females and absence it in the body cells of males, open the way for researchers to use this feature in the field genetic selection. This is called the sex chromatin or Bar bodies (Ali et al., 2008; Dyer, 2009). Review of literature revealed scarce publications concerning the types of sex chromatin and its relation to blood biochemical substances in the local Iraqi camelids. Therefore, this study was designed to show the roles of different types of sex chromatin of polymorphonuclear white blood cells (neutrophil) and its relation to some biochemical features, in addition to know the best parameters that can be used as a guide for breeding selec-

tions.

## MATERIALS AND METHODS

The study was carried out on 30, adult dairy, 5-10 years old she camel during the period from August 2017 to February 2018, at Al-Rehab/Samawa district/Al Muthanna province. Moreover, all data and information regarding each animal were recorded. Blood samples were collected from milk vein using 10 mL vacuum tubes without and with anticoagulant (EDTA) and kept in cool box (Young, 2000). The samples were transferred immediately to the laboratory, College of Veterinary Medicine, University of Kerbala. Then, 8 blood smears were prepared from each blood sample (totally 240 blood smears). All blood smears were stained with freshly prepared Giemsa stain after fixation with alcohol. After ten minutes the slides were washed with water and air-dried. Drops of Canada balsam were placed on each slide to fix the covered slides (Coles, 1986). All prepared blood smears were examined under light microscopy using oil immersion lens (X100) magnification lens multiply by (X10) optical lens. Serum samples were collected from blood samples after centrifugation for 5 minutes (Centrifuge -T-30 Germany) at 5000 RPM/minutes and kept at  $-5^{\circ}\text{C}$  until analysis. Serum samples were analyzed to estimate metabolic material (glucose, total protein, cholesterol and triglycerides) using appropriate commercial kits and measured by Spectrophotometer (PD303- Germany) using different wavelength. Glucose and cholesterol; total protein and triglyceride were measured using Agappe Kit (USA) (Tietz, 1999), Spinreact Kit (Spain) (Young, 1995) and Cromatest Kit (Spain) (Young, 2000) respectively, using wavelength 505 and 500 nm; 540 nm and 500 nm respectively.

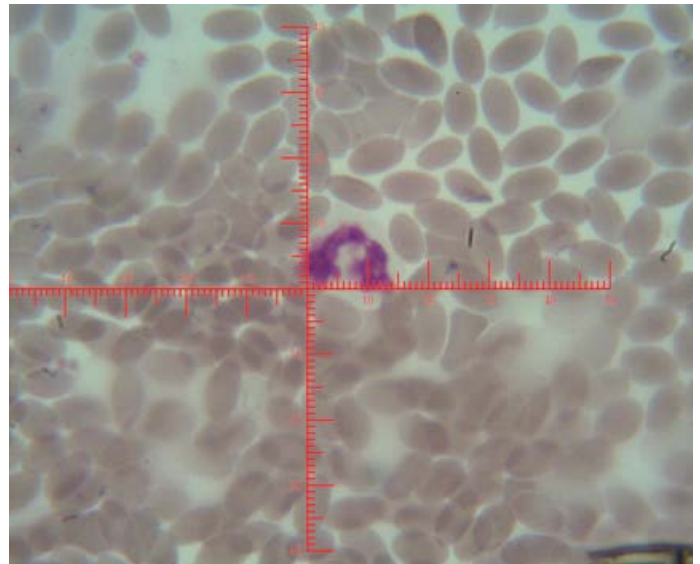
### STATISTICAL ANALYSIS

Statistical analysis was done using SAS program, specifically the general linear method to study the effect of sex chromatin types in some biochemical constitutions (SAS, 2010). However, the chi-square test was used to compare the relative distribution of the different types of sex chromatin in the studied traits.

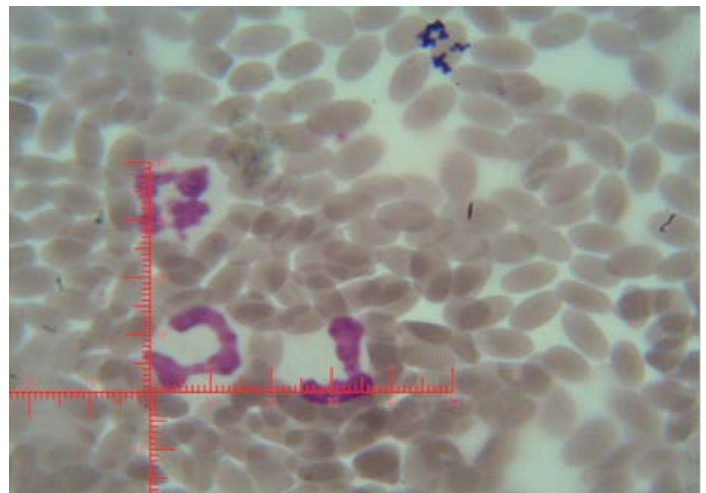
## RESULTS AND DISCUSSION

The number of sex chromatin and its distribution percentages in neutrophil (polymorphonuclear WBCs) in blood samples of she camels are presented in Table 1. Different types of sex chromatin were seen as Drum stick (Figure 1), Sessile nodule (Figure 2), small club (Figure 3) and Tear drop (Figure 4).

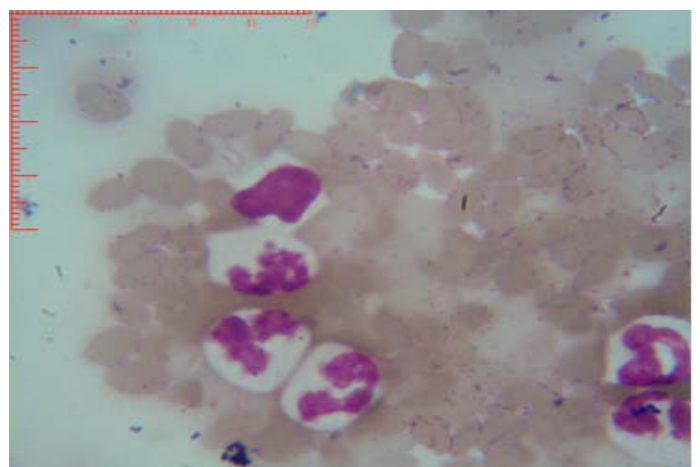
A high significant ( $p < 0.01$ ) result was observed for the drumstick type in compare to the other types of sex chrom-



**Figure 1:** Shows sex chromatin types; small club, the horizontal and vertical dimension measurements in the nucleus of the neutrophils (x1000)

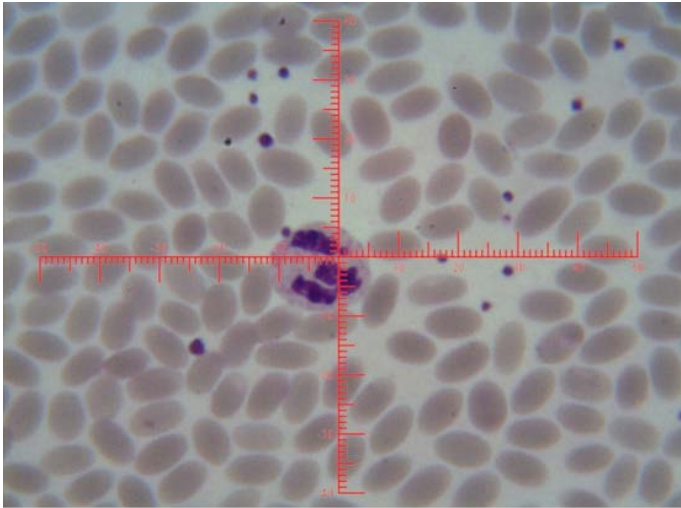


**Figure 2:** Shows sex chromatin type Sessile nodule, the horizontal and vertical dimension measurements in the nucleus of the neutrophils (x1000)



**Figure 3:** Shows sex chromatin type tears drop, the horizontal and vertical dimension measurements in the nucleus of the neutrophils (x1000)





**Figure 4:** Shows sex chromatin type tears drop, the horizontal and vertical dimension measurements in the nucleus of the neutrophils (x1000)

atin. The percentages of sex chromatin types including, Drum stick, Sessile nodule, small club and Tear drop were 59.95%, 25.20%, 8.53%, and 6.31% respectively. This results are compatible with previous results reported in cows (Al-Janabi and Al-Essawi, 2010), however, this results are disagreed with previous studies on sheep (Raouf et al., 2017), who reported the different sex chromatin percentages as 60.22%, 23.37%, 8.54% and 7.87% for sessile nodule drum stick, small club and Tear drop respectively. Meanwhile, the results of the current study is compatible with (Al Anbari and Al Khazragi, 2012) specifically in low percentages of small club and tear drop with 1.89% and 9.25% respectively, but disagreed with (Al-Jebori, 2013) with percentages of 29.35 & 14.30% ,respectively, and (Abbas, 2016) with 52.00%, 34.7%, 12.57% and 0.72% for sessile nodule, small club, drum stick and tear drop respectively.

**Table 1:** Shows the sex chromatin numbers and percentages of distribution sexual white blood cells (neutrophils) in local Iraqi camel.

No	Number of animals	Types of chromatin	Number of appearance	Number of sex chromatin	Percentage (%)
1	30	Drum stick	6000	3594	59.90
2	30	Sessile nodule	6000	1515	25.25
3	30	Small club	6000	511.2	8.52
4	30	Tear drop	6000	379.6	6.32
Total					100%
Chi square ( $\chi^2$ )					11.407 (P<0.01)

The means  $\pm$  SE of sex chromatin dimensions and nucleus measurements are represented in Table 2. The horizontal and vertical dimensions and sex chromatin area were  $1.110 \pm 0.05 \mu\text{m}$  and  $1.124 \pm 0.05 \mu\text{m}$   $986.0 \pm 0.07 \mu\text{m}^2$  respectively. While, the horizontal and vertical dimen-

sions and the area of the nucleus means were  $11.55 \pm 0.29 \mu\text{m}$ ,  $11.12 \pm 0.30 \mu\text{m}$  and  $101.40 \pm 4.76 \mu\text{m}^2$  respectively. Meanwhile, the average percentage of the sex chromatin area to the nucleus area was  $1.064 \pm 0.07\%$ . In addition, the average number of lobes in the nucleus was  $3.82 \pm 0.14$ . The results of the current study are compatible with the previous study in sheep (Khazraji and Al-Nabari, 2012), who showed similar measurements  $1.30 \mu\text{m}$ ,  $1.02 \mu\text{m}$  and  $1.041 \mu\text{m}$  for horizontal dimension, the vertical dimension and sex chromatin area respectively. Meanwhile, the horizontal, vertical dimension, nucleus area and sex chromatin area / nucleus area and number of lobes were  $11.56 \mu\text{m}$ ,  $11.33 \mu\text{m}$ ,  $102.82 \mu\text{m}^2$ ,  $1.01\%$  and  $3.95$  lobes respectively. Khazraji and Al-Nabari, (2012) showed that the horizontal and vertical length of the nucleus and nucleus area were  $14.73 \pm 0.29 \mu\text{m}$ ,  $14.36 \pm 0.34 \mu\text{m}$  and  $166.05 \pm 5.66 \mu\text{m}^2$  respectively. While, the horizontal and vertical dimension and the area of sex chromatin were  $1.096 \pm 0.04 \mu\text{m}$ ,  $1.110 \pm 0.03 \mu\text{m}$  and  $986.0 \pm 0.04 \mu\text{m}^2$  respectively. Moreover, the mean of sex chromatin area / nucleus area and number of lobes in the nucleus were  $0.632 \pm 0.04\%$  and  $4.30 \pm 0.10$  in cows (Al-Janabi and Al-Essawi, 2010). The results of the current study is compatible to previous study (Raouf et al., 2017) who found that the horizontal and vertical dimension, sex chromatin area and the number of lobes were  $1.32 \mu\text{m}$ ,  $1.26 \mu\text{m}$ ,  $0.943 \mu\text{m}^2$  and  $4.18$  respectively. However, Al-Jebori, (2013) studied these features found that the horizontal and vertical dimension, the area of sex chromatin and the number of lobes were  $1.02 \mu\text{m}$ ,  $0.761 \mu\text{m}$ ,  $2.50 \mu\text{m}^2$  and  $3.43 \mu\text{m}$  respectively in female Shami goats. While, the horizontal and vertical dimension and the nucleus and sex chromatin areas / nucleus area and number of lobes were  $8.12 \mu\text{m}$ ,  $7.76 \mu\text{m}$ ,  $64.73 \mu\text{m}^2$ ,  $4.36\%$ , and  $3.43$  respectively. However, the horizontal and vertical dimension and sex chromatin area were  $1.02 \mu\text{m}$ ,  $0.96 \mu\text{m}$  and  $2.37 \mu\text{m}$  respectively in local goats. Furthermore, the horizontal dimension, nucleus area and chromatin area / nucleus area and number of lobes were  $7.87 \mu\text{m}$ ,  $7.91 \mu\text{m}$ ,  $57.42 \mu\text{m}^2$ ,  $5.00\%$  and  $3.62 \mu\text{m}$ , respectively.

These results demonstrated that the sex chromatin area was almost constant in most farm animals, although there was a slight difference between them. And, if the slight differences were observed, they are due to differences in the size of the chromatin x (John et al., 2003; Bhatia and Shanker, 1982). Moreover, the difference in the nucleus area is also due to the difference in the size of the white blood cells (neutrophils) among animals (Khazraji and Al-Nabari, 2012).

The overall mean  $\pm$  SE for the tested milk samples from local Iraqi camels are presented in Table 3. The mean  $\pm$  SE of glucose, total protein, total cholesterol and triglyceride-swere  $118.89 \pm 2.74 \text{ mg / dL}$ ,  $7.61 \pm 0.18 \text{ g / dL}$ ,  $70.80 \pm 2.14 \text{ mg / dl}$  and  $55.28 \pm 1.27 \text{ mg / dl}$  respectively. The re

**Table 2:** Shows the sex chromatin characteristics and nucleus measurements in the local Iraqi she camels (mean ± SE).

No.	Sex chromatin & Nucleus features	Number of appearance	Mean± SE
1.	Horizontal dimension of sex chromatin (µm)	6000	1.110 ±0.05
2.	Vertical dimension of sex chromatin(µm)	6000	1.124 ± 0.05
3.	Sex chromatin area (µm <sup>2</sup> )	6000	0.986 ± 0.07
4.	Nucleus horizontal dimension (µm)	6000	11.55 ± 0.29
5.	Nucleus vertical dimension (µm)	6000	11.12 ± 0.30
6.	Nucleus area (µm <sup>2</sup> )	6000	101.40 ± 4.76
7.	Sex chromatin area(µm <sup>2</sup> )	6000	1.064 ± 0.07
8.	Lobes numbers	6000	3.82 ± 0.14

**Table 3:** Biochemical parameters and milk recipes studied in the local Iraqi market (general mean ± standard error)

Studied Traits		Number of the animals	mean ± SE
Blood Biochemical parameters	Glucose( mg/dl)	30	118.89 ± 2.74
	Total protein( gn / dl)	30	7.61 ± 0.18
	Cholesterol ( mg/dl)	30	70.80 ± 2.14
	Triglycerides (mg/dl)	30	55.28 ± 1.27
Milk properties	Fat %	30	3.40 ± 0.11
	Protein%	30	3.60 ± 0.10
	Lactose %	30	4.8 ± 0.12
	Non-lipid solid material	30	11.25± 0.17

sults of this study are compatible with previous study done on camel (Zeidan et al., 2011), who found that total protein and cholesterol concentration were 7.02 g/dl and 88.65 mg / dl respectively. Moreover, the results of the current study are also in agreement with previous researchers, who found that the total protein, glucose, cholesterol and triglyceride concentration in camels were 7.18 g / dl, 98.12, 114.23, and 36.17 mg / dL respectively (Ohri and Joshi,1961), and (6.16 g / dl), (110.04 mg / dL), (38.30 mg / dL) and, (34.30 mg /dL)respectively (Albomohsen, 2011; Ali et al., 2008). However, the results of this study are disagreed with another study in camel (Raghvendar et al., 2004). These differences in concentrations of biochemical parameters may be due to differences in animal strain, food and health status of the herd, sample size and geographic location. The mean ± standard error of fat, protein, lactose, and non-lipid solids content in milk are presented in Table 3 and were 3.46 ± 0.11, 3.52 ± 0.10, 4.14 ± 0.12 and 11.05 ± 0.17% respectively. These results are compatible with previous study (Ohri and Joshi,1961), which found that the averages of fat, protein, lactose and non-lipid content were 4, 3.46, 4.86 and 12.2% respectively. Meanwhile, the results of the current study are disagreed with (Al-Rubaie et al., 2013), who found that fat, protein, lactose, and non-lipid solids content percentage were 3.13, 3.7, 4.67 and 11.29% , and also with (Raghvendar et al., 2004) with percentage of 5.5,

4.5, 5.8 and 13.95% for fat, protein and lactose respectively. These differences may be occurred due to the variations of the breed of animal, the health status of the herd and the type of nutrition and geographical location.

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## CONFLICT OF INTEREST

This research is a personal non-profit work and there is no conflict of interest.

## AUTHORS CONTRIBUTION

Both of Ali J. Al-Nuaimi and Mayada S. Hassan are responsible for animal work and samples collection. Ali M. Al-Yasari and Yasser J. Jameel are responsible for data analysis, writing correction and proof reading.

## REFERENCES

- Abbas R (2016). Relationship of figures and measurements of sex chromatin with some biochemical traits of blood and milk in local buffaloes. Master Technol. Anim. Reprod. Tech. Al- Musaib Technical College.
- Al Anbari NN, Al Khazragi WJM (2012). The Role of Sex Chromatin in performance of Turkish Awassi sheep. J. Vet. Sci. 5:(1). (Arabic language)
- Al- Janabi AS, Al-Essawi MA (2010). Sex Chromatin Picture Sharabi Cows in Iraq .Al- Anbar J. Vet. Sci. 3: 37- 40.
- Albomohsen H, Mamouei S, Tabatabaei S, Fayazi J (2011). Metabolite composition variations of follicular fluid and blood serum in Iranian dromedary camels during the peak breeding season. J. Anim. Ver. 3: 327-331. <https://doi.org/10.3923/javaa.2011.327.331>
- Ali S, Ahmad N, Akhtar N, Rahman ZU, Noakes DE (2008). Metabolite contents of blood serum and fluid from small and large sized follicles in dromedary camels during the peak and the low breeding seasons. Anim. Reprod. Sci. 108:446 - 456. <https://doi.org/10.1016/j.anireprosci.2007.10.001>
- Al-Issawi AH, Al-Rabiye HMA, AlAnbari NN (2013). Study of sex chromatin traits and it's relation with production and reproduction performance in local Awassi sheep. J. Babylon Uni. 21(4). (Arabic language).
- AL-Jebori RAA (2013). The relationship between sex chromatin at some blood charecteristics and prolificacy in Shammi (Damascus) and native female goats .Master of technology in animal reproduction techniques. Al- Musaib Technical College.
- Al-Rubaie (2013). Study of the characteristics of chromosomal sex (chromatin sex). J. Uni. Babylon Pure Appl. Sci. Number (4).

- Atsan T, Emsen E, Yaprak M, Dagdemir FV, Diaz CAG (2007). Aneconomic assessment of differently managed sheep flocks in eastern Turkey. *Ital. J. Anim. Sci.* 6:407– 414. <https://doi.org/10.4081/ijas.2007.407>
- Bhatia S, Shanker V (1982). Sex chromatin types in leucocytes of Alpines Beetals and their cross breed goat. *Anim. Breed Abst.* 50: 5612.
- Coles EA (1986). *Veterinary Clinical Pathology*. 4th edi. Saunders W. B. Co. Philadelphia. London . 124 - 127.
- Deuraseh N (2005). The urine of camels. *Treatment of diseases in AL-Tibb Al-Nabawi*. *Int. Med. J.* 4(1): 25-28.
- Dyer BD (2009) . *The basic of Genetics* . Wheaton College. I S B N:978-1- 4361-6994.
- John CR, Douglas KM, Karen CI (2003) . *The biology ,care and production of domestic animals*. Published by Edward E. Bartel Margaret. J. Kemp. 12: 247 – 248
- Khazraji, Al-Nabari (2012). Predict the performance of Turkish ewes through sexual pigment characteristics. *Tikrit University J. Agric. Sci.* 12. Number (2)
- Ohri SP, Joshi BK (1961). Composition of milk of camel. *Ind. Vet. J.* 38 (10): 514–516.
- Raghvendar S, Shukla SK, Sahani MS, Bhakat C (2004). Chemical and physicochemical properties of camel milk at different stages of lactation. In: *International Conference, Saving the Camel and peoples' Livelihoods*, Sadri, Rajasthan India. p. 37.
- Raof SO, Yahya SS, Birkhader D, Mohamad YA (2017). Role of Sex Chromatin on performance in Arabi sheep. *Iraqi J. Vet. Med.* 41(1):145-150
- SAS (2010). *SAS/STAT User's Guide for Personal Computer*. Ver. 9.1 SAS Institut Inc., Cary, NC, USA.
- Tietz NW (1999). *Test book of clinical chemistry* 3<sup>rd</sup> ed. C.A. Buritis, E.R. Ashwood. W.B. Saunders. 809-857.
- Wardeh MF (2004). Classifications of dromedary camel *J. Camel Sci.*1:1-7.
- Yagil R (2000). Lactation in the desert camel (Camelus dromedaries) In: Gahlot, T.K. (ed.) *Selected topics in camelids*. The Camelid Publishers, Bikaner. PP. 61-73.
- Young DS (2000). *Effect of drugs on clinical laboratory tests*. 4th Ed .AACC.
- Young DS (1995). *Effect of drugs on clinical laboratory tests*.,4th Ed. 573-589.
- Zeidan AEB, El-HarairySh A, Gabr MA, Tag El-Dien, Abd El-Rahman, Amer AM (2011). In vitro maturation of camel oocytes As affected by different media during breeding and non-breeding seasons. *J. American Sci.*7(1).