

## **EFFECTS OF AGING ON SOME ENZYME BIOCHEMICAL RELATED TO OXIDATION IN SERUM OF LOCAL COWS**

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(Received 1 October 2017, Accepted 17 September 2017)

**Key words :** aging , local cows, Antioxidants.

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### **ABSTRACT**

The study was included 90 local cows from Al-Rashidea area which locates in the east of Baghdad city, distributed into three groups, the smallest aged group (30) cows (1.5-2 ) years, middle aged group (30) cows (5.5-7) years and the older aged group (30) cows (11-13) years to study the effect progressing of age on some biochemical Criterias as indicators of oxidative stress. The results revealed that the antioxidant enzymes, Glutathione -S-transferase GST was increased significantly ( $p < 0.05$ ) ) in middle -aged group And lower value in the older aging , it was noticed that arylesterase enzyme gradually decreased significantly with age progress. The non enzymatic antioxidants such as Glutathione GSH revealed with the higher great value in the middle age group and the lower significant value in the aging compared with other groups. on the other hand Malondialdehyde (MDA) and peroxy nitrite (ONOO-) level gradually increased with progressing of age, these events because of an increasing in production of free radicals and oxidative stress accompanied with processing of age due to antioxidants depletion, which consider as a defense line of body against the free radicals effects. It was concluded from this study that with aging processes have harm effects on blood components diagnosed by reducing in antioxidants levels and increasing of Malondialdehyde and peroxy nitrite which consider as an indicators of oxidative stress and this support the theory of free radicals and oxidative stress and their role in aging processes . Study the effect of aging on some biochemical parameters and antioxidant in cow.

### **INTRODUCTION**

Senility is defined as complex process that cause physiologies change in body functions leading to the death of organs responsible for those functions. Age progression is accompanied by a combination of mutations that occur in deoxyribonucleic acid (DNA), A defect in the function of proteins and alteration in the system of antioxidants as a many enzymes are influenced by aging, all of these make the member of the pyramid more impressionable to diseases, especiality degenerative - diseases (1).

There are Many agents affects aging, like feed, nature ,cause,life, genie, background, etc. Two attempts it has been made to- explain this phenomenon, Several hypothesizes it has been trying to explain old-age, including: Randomlly genetic damages ,An evolutionary processes accompanied with the immune, system and the neurodegenerative system and The genetically programmed theory of aging . Theory of free radical damage , The treatment of free radicals is bases, on the measurement of multichemical and phylogenetic parameters that gradually changing with aging. The most agreeable among these theories are the theory of free -radicals that appear in this last seven contracts and was applied by the Harmans . This theory widely accepted by researchers and directed attention(2)(3) .

These advances in age and the occurrence of illness are accompanied with oxidation stress, which happened with an increase in age ,in the reactive oxygen species in mitochondria is observed during mitochondrial respiration(4). The reactive species of oxygen of external sources due to pollution of air in industrial cities, The aging process is associated by alterations in cellular metabolism, an increase in lipid peroxidation, proteins oxidation and alterations in antioxidants enzymes such as superoxide dismutase (SOD), catalase , Glutathione Peroxidase (GSH-pX), Glutathione reductase), and change in mineral levels such as selenium Se, manganese Mn, copper Cu and Zn zinc, vitamins and uric acid(5) (6).

#### **Aims of The Study:**

Study the effect of aging on some biochemical parameters and antioxidant in cows.

## **MATERIALS AND METHODS**

#### **Animal of Samples :**

Blood samples was collected from cattle field cow in Al-Rashidiya area in the east by 90 cows, divided into three groups equally the first group (30) ,(1.5-2 ) years, the second group (30) , (5.5-7) years ,The 3th group included 30 cows aged (11-13) years.

The period of blood collecting about one and a half months, once a weeklly. Blood was collected from the jagular vain using syringes (20 ml) after sterilization of the area well before collecting . Blood was placed in test tubes that did not contain a coagulation inhibitor. Cycle / minute for biochemical tests.

The study period lasted from 1/2/2017 until 15/3/2017 and the tests were done in the chemistry laboratory of Munther Mustafa.The fist day of collecting 17 samples collected on date 1/2/2017.The second day of collecting 11 samples collected on date 7/2/2017.The third day of collecting 23

samples collected on date 22/2/2017. The fourth day of collecting 19 samples collected on date 28/2/2017. The fifth day of collecting 20 samples collected on date 15/3/2017.

**Measured parameters:**

1. Determination of the level of Glutathione (GSH) in serum:  
The level of Glutathione was estimated using the modified method used by the researcher (7).
2. Determination of the effectiveness of the enzyme arylesterase in serum:  
The efficacy of arylesterase was estimated by method (8).
3. Determination of the effectiveness of the enzyme Glutathione - S - transferase in the serum:  
The efficacy of Glutathione -S-Transferase (GST) was estimated according to the method previously mentioned by (9).
4. Determination of the level of malonodialdehyde (MDA) in the serum:  
The serum lipid peroxidation level was estimated by measuring the level of MDA as a final product of lipid peroxidation mentioned by (10).
5. Determination of level of the peroxy nitrite (ONOO<sup>-</sup>) in serum:  
The level of peroxy nitrite radical was estimated based on the modified method according to researchers (11).

**3- Statistical analysis**

The data were analyzed statistically by one-way ANOVA. Values in the tables indicate the Mean  $\pm$  S.D values and the probability level at ( $P \leq 0.05$ ).

## RESULTS

Table (1) showing the effects of aging on the biochemical parameters of local cattle .

Parameters	Mean $\pm$ Standard Errors		
	Cattle at (1.5-2 ) years	Cattle at (5.5-7) years	Cattle at (11-13) years
Glutathione ( $\mu\text{ml/L}$ )	1.78 $\pm$ 0.132 B	3.70 $\pm$ 0.185 a	0.96 $\pm$ 0.069 c
Glutathione-S-Transferase (U/L)	2.98 $\pm$ 0.119 B	5.7 $\pm$ 0.015 a	1.99 $\pm$ 0.012 c
arylesterase (U/ml)	0.69 $\pm$ 0.112 A	0.48 $\pm$ 0.071 b	0.35 $\pm$ 0.062 c
malonadialdehyde ( $\mu\text{ml/L}$ )	3.88 $\pm$ 0.119 B	5.67 $\pm$ 0.015 a	2.12 $\pm$ 0.021 c
peroxy nitrite ( $\mu\text{ml/L}$ )	0.07 $\pm$ 0.001 B	0.05 $\pm$ 0.003 c	0.17 $\pm$ 0.002 a

*N=(10) animals*

*Values represent the mean  $\pm$  s.d.*

*Different characters in the same row mean significant difference at a significant level ( $P \leq 0.05$ )*

## DISCUSSION

The results of this study were shown to have decreased the level of Glutathione in the serum in cattle at (11-13) years. This study agreed with the results obtained by researcher, that the Glutathione decreases with age due to the lack of manufacturing in the cells resulting from the lack of amino acids formed in the body. The results of the study showed that aging leads to increased consumption of Glutathione as an anti-oxidant to remove the toxicity of cells, which increase in age because of the increase in lipid peroxidation leading to the consumption of Glutathione deficiency in the nerve tissue because of the increased harm caused by active oxygen classes (ROS), The results also agreed with each of (12) that age increased the level of hydrogen peroxide in mitochondria and thus a low level of Glutathione. The results agreed with researchers (13) who observed a significant reduction in the level of superoxide dismutase and Glutathione -S-Transferase Age increases due to increased oxidative stress resulting from aging, where decay of the mitochondria occurs and thus an increase in the rate of production of oxidants by increasing oxidative damage to biomolecules. This may contribute to the aging process as well as degenerative diseases. The cellular distribution and bioavailability of antioxidants compared with oxidants vary with age and are the free radicals responsible for this change. As noted in our current study, a decrease in the effectiveness of the enzyme arylesterase with age. These results

were consistent with what (14) reported that age progression causes a decrease in the effectiveness of the arylesterase. It has been reported that the age leads to a decrease in the effectiveness of the enzyme arylesterase. The researcher said that the reason for the decline in the enzyme arylesterase is due to increased oxidative stress that occurs with age and that the enzyme arylesterase decreases with the increase of the production of free radicals in the body's tissues as the efficiency of the enzyme arylesterase decreases in the analysis of fat oxidants and noted that age cause decreaseing the level of the arylesterase. The results showed that age progression led to a decline in the level of physiological function and to an excessive increase in the production of free radicals, which in turn overcame antioxidants and caused an increase in the production of malonadialdehyde . The results also agreed with (15) that increased malonadialdehyde resulted from a free radical attack on unsaturated fatty acids of living membranes leading to increased lipid peroxidation, increased attacks with increased oxidative stress, increased age, and increased age in experimental animals (Cows) increased oxidative stress due to increased production of free radicals for various reasons, including continued exposure to environmental factors and contaminants. This was evident by the reduction of antioxidants and increase the level of malonadialdehyde and peroxy nitrite (16). It is noted in this study that the level of peroxy nitrite ( $\text{ONOO}^-$ ) increases with age and this is consistent with what he noted that aging lead to increase the level of peroxy nitrite for its important role as oxidant and its contribution to the increase of oxidative stress , He also said progress in age leads to an increase in active nitrogen varieties (RNS) and a lack of antioxidants and that peroxy nitrite is one of those varieties that increase with age. It is mentioned that the manufacture of nitric oxide (NO) is associated with free radical breeding, especially the superoxide root, which increases in the case of oxidative stress, and the nitric oxide in turn turns to peroxy nitrite, thus increasing the level of peroxy nitrite due to the increase of free radicals and increase in Age cause increasing in the level of the level of peroxy nitrite due to oxidative stress due to the increase in free radicals, especially the root ( $\text{O}_2^-$ ), which reacts with NO and causes an increase in the level of peroxy nitrite, which is what we observed in our current study (17).

تأثير تقدم العمر على بعض المعايير الكيموحيوية في مصل الابقار المحلية  
عيسى دهام الهذيل  
مركز بحوث النانوتكنولوجي والمواد المتقدمة ، الجامعة التكنولوجية ، بغداد ، العراق  
الخلاصة

شملت الدراسة ٩٠ حيوان من اناث الابقار المحلية في مدينة الراشدية شرق بغداد وبواقع ثلاث مجاميع اذ تكونت المجموعة الاولى من (٣٠) عجلة وبعمر (١.٥-٢) سنة، واحتوت المجموعة الثانية على (٣٠) بقرة بعمر (٥.٥-٧) سنة اما المجموعة الثالثة فضمت (٣٠) بقرة بعمر (١١-١٣) سنة .  
تبين من خلال النتائج التي حصلنا عليها ان كل من مضاد الاكسدة الانزيمي الكلوتاتايون-اس- ترانسفيريز، ازداد معنوياً ( $P < 0.05$ ) في مجموعة الاعمار المتوسطة وسجل ادنى قيمة معنوية له في مجموعة الاعمار الكبيرة بالمقارنة مع مجموعة الاعمار الصغيرة وانخفض انزيم الاريل استيريز انخفاضاً تدريجياً معنوياً بتقدم العمر. اما مضاد الأوكسدة غير الانزيمي الكلوتاتايون GSH فقد سجل اعلى القيم المعنوية في مجموعة الاعمار المتوسطة وادنى القيم المعنوية في مجموعة الاعمار الكبيرة بالمقارنة مع مجاميع الدراسة وان كل من المالوندايالديهيد والبيروكسي نيتريت قد ازداد ازيداً تدريجياً معنوياً بتقدم العمر وهذا يعزى الى زيادة في الكرب التأكسدي والجنور الحرة التي ترافق التقدم بالعمر يصاحبها قلة في مضادات الاكسدة التي تعد خطاً دفاعياً للجسم ضد تأثيرات الجنور الحرة . استنتج من الدراسة الحالية ان التقدم في العمر اثر تأثيراً سلبياً على معايير الدم الكيموحيوية اذ انخفضت مضادات الاكسدة وارتفع المالوندايالديهيد والبيروكسي نيتريت كمؤشرات للكرب التأكسدي مما يؤكد فرضية الجنور الحرة والكرب التأكسدي ودورهما في تقدم العمر في اناث الابقار المحلية. وتضمنت الدراسة تأثير التقدم بالعمر على بعض المعير الكيموحيوية والتي تعمل كمضادات للاكسدة في الأبقار.

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