

**STUDY OF THE LEVELS OF VITAMIN A AND BETA
CAROTENE IN BLOOD SERUM OF HEALTHY
AND DISEASED BALADY SHEEP
IN UPPER EGYPT**

BY

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SUMMARY

A total number of 192 Balady ewes were selected from Sohag and Assiut Governorates to evaluate blood serum concentration of vitamin A and β -carotene in health and diseased conditions. Animals were classified equally into 4 groups, 48 each (3-4, 6, 8-12 months and over one year). After clinical examination, each group was sub-classified into five groups. The first (12 each) was proved healthy while the rest (36 each) was classified equally into 4 groups (9 each) including acute pneumonia, chronic pneumonia, acute enteritis and chronic enteritis at different ages. The obtained results declared that the mean values of vitamin A and β -carotene in blood serum in clinically healthy ewes was significantly higher in young animals especially those aged 3-4 months when compared with mature animals (over one year). On the other hand, blood serum concentrations of vitamin A and β -carotene were significantly reduced in ewes affected with acute and chronic pneumonia as well as those affected with acute and chronic enteritis at different ages when compared with the corresponding control animals. Consequently, blood serum concentration of vitamin A and β -carotene should be corrected during the course of acute and chronic respiratory and digestive diseases in sheep for the sake of correct and quick treatment.

INTRODUCTION

Vitamin A is a dietary essential for all animals. This vitamin not occur in plants but it occurs as its precursor, carotene, which is known as provitamin A that converts to vitamin A in the animal body (Rai, 1981 and Murray et al. 1993).

Vitamin A has many important functions, among them the integrity of epithelial tissues and normal bone development (Shinodler, 1986; Jimmy, 1986; 1986 and Payne 1989). It is an important vitamin for night vision, correction of cerebrospinal fluid pressure, bone growth and embryological development (Sherman, 1986; Sucov & Evans, 1995 and Kaneko et al. 1997). It is emphasized

that the incidence and severity of bacterial, viral, rickettsial and parasitic infections are higher in vitamin A deficient animals (Radostits et al., 2000 and Smith, 1996).

The effects of vitamin A and β -carotene on host mechanism have been uncertain and controversial for many years. It is possible that vitamin A and β -carotene afford protection against infection by influencing both specific and non-specific host defense mechanisms (Sherman, 1986, Pondi, 1987, Payne, 1989 and Smith, 1996).

Information about vitamin A and β -carotene changes in healthy and diseased Egyptian Balady ewes still scarce, and the updated data on these indices will provide a source of valuable guides for diagnosis and treatment especially under Upper Egypt climatic conditions. So, the present investigation was aimed to evaluate vitamin A and β -carotene in healthy ewes and to monitor the effect of acute and chronic pneumonia and enteritis on their blood serum vitamin A and β -carotene level.

MATERIALS AND METHODS

A total number of 192 Balady ewes were selected from Sohag and Assiut Governorates. Depending on age, animals were classified equally into 4 groups, 48 each (3-4, 6, 8-12 months and over one year). After clinical examination, each group was sub-classified into five groups. The first (12 each) was proved clinically healthy while the rest (36 each) was classified equally into 4 groups (9 each) including acute pneumonia, chronic pneumonia, acute enteritis and chronic enteritis at different ages.

Blood samples were collected from each animal by jugular vein-puncture for obtaining serum. The collected sera samples were used for the determination of vitamin A and β -carotene according to the method described by Carr and Price (1926). Obtained results were subjected to 2 way analysis of variance (ANOVA) and expressed as mean \pm SD to differentiate between values of healthy control group according to different ages and also between diseased animals and their corresponding healthy control groups using software program (Prism, 1996).

RESULTS

Mean results, as shown in tables 1&2 and figures 1&2, declared that values of vitamin A and β -carotene in blood serum in clinically healthy ewes at 3-4 months ages were in general higher than other groups and were significantly higher than mature animals (over 1 year).

The mean levels of vitamin A and β -carotene in blood serum (μ g %) of diseased ewes either by acute pneumonia, chronic pneumonia, acute enteritis or chronic enteritis were significantly reduced if compared by the corresponding healthy animals at different ages.

In addition, the reduction of the mean values of vitamin A and β -carotene in blood serum of diseased ewes was more pronounced in acute cases of

pneumonia, while in ewes affected with enteritis the reduction was greatly manifested in chronic cases.

DISCUSSION

The evaluation of vitamin A and β -carotene in the blood takes great importance in judging the health condition of the animal and may be of value in clinical diagnosis and treatment of many pathological disorders (Kaneko et al. 1997).

In clinically healthy ewes, the present study revealed that the mean values of vitamin A and β -carotene in the blood serum of young ewes were significantly higher than old mature animals. These results coincide with the data obtained by Abdel-Salam et al. (1995), Omar, (1997) and Matta (1997) and lies within the normal physiological limits previously reported by Kaneko et al. (1997) and Radostits et al (2000).

The higher levels of vitamin A and β -carotene in young animals may be attributed to the reservoir supplied from their dams in addition to the need of these ingredients for essential vital live activity in the animal body mainly tissue growth and maintenance of health (Pondi, 1987 and Payne, 1989).

The data in the present investigation (tables 1&2 and figures 1&2) showed reduction in the values of vitamin A and β -carotene in diseased groups either by acute pneumonia, chronic pneumonia, acute enteritis or chronic enteritis at different ages if compared by the corresponding healthy animals. The reduction was more pronounced in most cases of acute enteritis than in other cases. These results are more or less agree with those reported by Omar (1997).

The effects of vitamin A and β -carotene on animal biological mechanisms have been controversial for many years. Recently, many workers claimed that the incidence and severity of microbial infections are higher in vitamin A deficient animals during disease process especially during acute stages (Sherman, 1986, Pondi, 1987, Payne, 1989 and Smith, 1996). It is possible that vitamin A and β -carotene afford protection against infection by influencing both specific and non-specific host defense mechanisms and hence it could be extensively consumed in diseased ewes (Kaneko et al 1997 and Radostits et al., 2000).

The study declared that vitamin A and β -carotene in Egyptian Balady sheep are seriously affected by diseased conditions. So, these constituents must be taken in consideration during the course of acute and chronic diseases in sheep, in such a way that they must be supplied and corrected in the diet to avoid any subsequent pathological disorders, and for assurance of correct treatment and animal welfare.

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Figure 1): Mean values of vitamin A ($\mu\text{g } \%$) in blood serum of healthy and diseased Balady sheep in

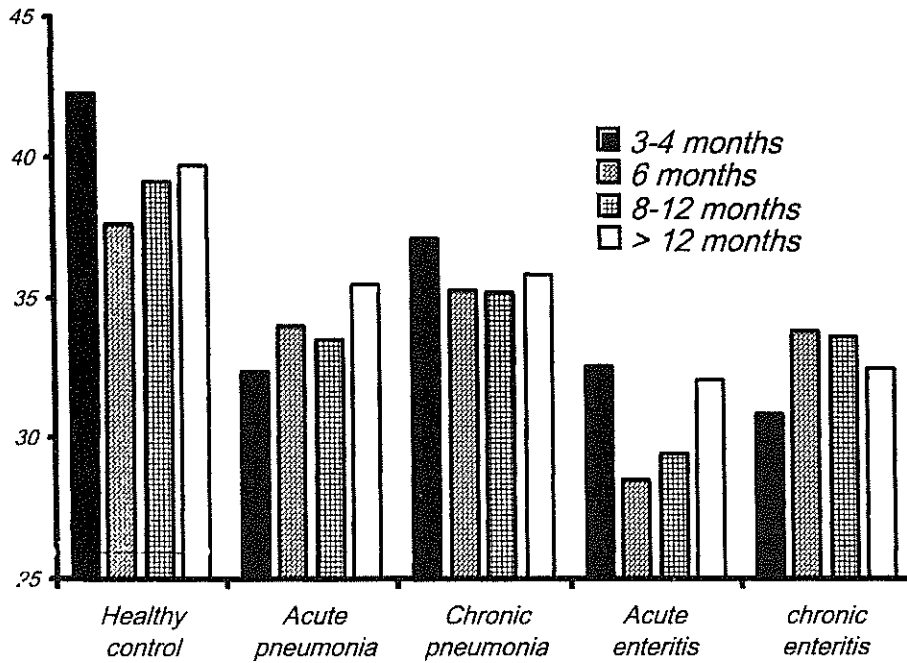


Figure 2): Mean values of β -carotene ($\mu\text{g } \%$) in blood serum of healthy and diseased Balady sheep

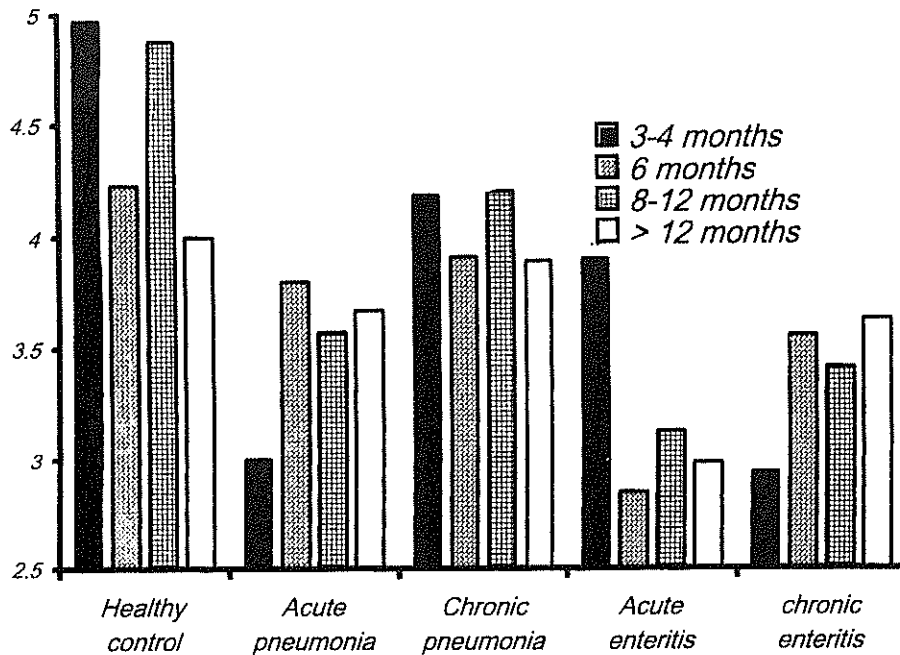


Table 1): Mean values of vitamin A ($\mu\text{g } \%$) in blood serum of healthy and diseased Balady ewes in Upper Egypt

Group		3-4 months	6 months	8-12 months	Over 12 Months
Healthy	Mean	42.28 ^a	37.67 ^b	39.10 ^{ab}	39.72 ^b
	SD	05.52	05.83	02.64	03.22
	Min	34.48	26.20	33.65	27.31
	Max	49.65	42.75	44.94	39.44
Acute pneumonia	Mean	32.37*	34.02*	33.50*	35.48*
	SD	03.81	01.79	01.03	00.81
	Min	27.31	32.00	32.22	34.44
	Max	35.31	36.13	34.56	36.25
Chronic pneumonia	Mean	37.15*	35.31*	35.22*	36.87*
	SD	00.60	02.52	01.28	01.33
	Min	36.40	32.55	33.85	34.18
	Max	37.79	38.34	36.56	37.20
Acute enteritis	Mean	32.55*	28.50*	29.40*	32.06*
	SD	01.70	01.31	00.61	00.93
	Min	30.34	27.03	28.69	30.94
	Max	33.93	31.06	30.11	33.09
Chronic enteritis	Mean	30.89*	33.83*	33.63*	32.49*
	SD	03.53	05.15	02.01	02.22
	Min	20.20	27.03	31.75	30.11
	Max	33.65	38.05	36.22	35.21

^{a,b}Values in the same row with unlike superscripts are significantly differing at $P < 0.05$
 *Values in the same column are significantly differing from the control group at $P < 0.05$

Table 2): Mean values of β -carotene ($\mu\text{g } \%$) in blood serum of healthy and diseased Balady ewes in Upper Egypt

Group		3-4 months	6 months	8-12 months	Over 12 Months
Healthy	Mean	4.97 ^a	4.23 ^b	4.88 ^a	4.00 ^b
	SD	0.77	0.92	1.07	0.49
	Min	3.50	2.77	3.07	3.27
	Max	5.97	5.10	5.70	4.60
Acute pneumonia	Mean	3.00*	3.80*	3.57*	3.67*
	SD	0.35	0.17	0.24	0.33
	Min	2.23	3.60	3.28	3.25
	Max	3.27	4.00	3.83	4.00
Chronic pneumonia	Mean	4.19*	3.91*	4.21*	3.69*
	SD	0.16	0.21	0.07	0.31
	Min	4.00	3.67	4.14	3.50
	Max	4.36	4.16	4.28	4.21
Acute enteritis	Mean	3.90*	2.84*	3.12*	2.98*
	SD	0.13	0.17	0.13	0.21
	Min	2.93	2.63	2.97	2.88
	Max	3.23	3.03	3.28	3.14
Chronic enteritis	Mean	2.93*	3.56*	3.41*	3.63*
	SD	0.34	0.50	0.18	0.31
	Min	2.50	2.93	3.25	3.34
	Max	3.27	4.07	3.64	4.04

^{a,b}Values in the same row with unlike superscripts are significantly differing at $P < 0.05$
 *Values in the same column are significantly differing from the control group at $P < 0.05$

الملخص العربي

دراسة عن مستويات فيتامين أ والبيتا كاروتين في مصل دم الأغنام
البلدية السليمة والمريضة في صعيد مصر

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اجري البحث على عدد ١٩٢ رأس من النعاج البلدية من محافظتي أسيوط وسوهاج لتقدير قيمة فيتامين أ ، البيتا كاروتين في مصل الدم في الحالات لسليمة و المريضة. أظهرت النتائج أن مستوى هذه القياسات في دم النعاج الصغيرة كان أقل من مستواه في النعاج البالغة. ومن ناحية أخرى انخفض مستواها في الدم في الحالات المصابة إصابات تنفسية أو معوية سواء كانت هذه الإصابات حادة أو مزمنة عن قرينتها في المجموعات الضابطة. هذا وقد أظهر البحث ضرورة تعديل مستوى فيتامين أ في الخراف أثناء الإصابة الحادة و المزمنة سواء بإضافته في العليقة أو بأي وسيلة أخرى لضمان سرعة الشفاء والعلاج من الإصابات سواء الرئوية أو الهضمية.