Comparative study of serum protein status of local breeds sheep and goats in Basra province

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Abstract

A total of twenty eight local breed sheep and goats (14 of each) of both sexes were used in this study to evaluate the blood protein status. Animals were divided into four equal groups: involving G1 (7 ewes), G2 (7 rams), G3 (7 does), and G4 (7 bucks). Blood biochemical analysis included estimation of total protein, albumin and globulins were done. Results displayed that the levels of total proteins were (6.15 ± 0.32 g/dL), (6.28 ± 0.37 g/dL), (6.62 ± 0.31 g/dL) and (6.52 ± 0.12 g/dL) in G1, G2, G3 and G4 respectively. Levels of albumin were (3.84 ± 0.37 g/dL), (4.11 ± 0.36 g/dL), (3.52 ± 0.22 g/dL) and (4.30 ± 0.30 g/dL) in groups (1, 2, 3 and 4) respectively. Levels of globulins were (2.31± 0.47g/dL), (2.97 ± 0.47g/dL), (3.10± 0.46g/dL) and (2.22 ± 0.34g/dL) in groups 1, 2, 3 and 4 respectively. The results of blood proteins showed no significant differences between all groups of the study in regard to the sex.

Key words: Blood plasma, total protein, albumin, sheep, goat.

دراسة مقارنة لمستوى البروتين في مصل دم السلالات المحلية للأغنام والماعز في محافظة البصرة

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الخلاصة

أستخدمت ثمان وعشرون من الاغنام والماعز المحلية لدراسة حالة البروتين في الدم. قسمت الحيوانات الى اربعة مجاميع سبعة حيوانات في كل مجموعة. تضمنت المجاميع سبعة نعاج (المجموعة الأولى)، سبعة كباش (المجموعة الثانية)، سبعة عنزات (المجموعة الثالثة)، سبعة أجداء (المجموعة الرابعة). تضمنت الفحوصات الكيموحيوية تقدير مستوى البروتين الكلي ، الالبومين والغلوبيولين. مستوى البروتين الكلي في هذه الدراسة كان (6.15 ± 0.32 g/dl)، (6.28 ± 0.37 g/dl) ، (6.62 ± 0.31 g/dl) و(6.52 ± 0.12 g/dl) في المجاميع (الاولى، الثانية، الثالثة والرابعة) على التوالي. ومستوى الالبومين كان (3.84 ± 0.37 g/dl) ، (4.11 ± 0.36 g/dl)، (3.52 ± 0.22 g/dl) و (4.30 ± 0.30 g/dl) في المجاميع الاولى، الثانية ، الثالثة والرابعة على التوالي. مستوى الغلوبيولين كان (2.31± 0.47g/dl) ، (2.97 ± 0.47g/dl) ، (3.10± 0.46g/dl) و(2.22 ± 0.34g/dl) في المجاميع الاولى ، الثانية ، الثالثة والرابعة على التوالي. اظهرت نتائج الدراسة عدم وجود اي تأثير للجنس على نتائج الدراسة.

الكلمات المفتاحية: بلازما الدم ، البروتين الكلي ، الالبومين ، الاغنام ، الماعز.

Introduction

Blood plasma is the yellowish protein-rich fluid that suspends the cellular components of whole blood which including the red blood cells, white blood cells and platelets. Blood plasma is representing almost 55% of the blood's volume and contains 90% water, 8% proteins, 0.9% inorganic ions, and 1.1% organic substances. Besides water proteins are the main constituents of the plasma (1). Plasma proteins form three major groups and have various functions as albumin (60% of total plasma protein), fibrinogen (4%), and globulins (36%). In blood plasma, by far the most prevalent protein is albumin, approximately 32 to 35 grams per liter, which helps to maintain the osmotic balance of the blood. It is estimated that plasma may contain as many as 40000 different proteins (2). The plasma total protein is mainly composed from albumin in

animals and this protein acts as a carrier for transport of different components such as hormones (e.g. thyroxin), fatty acids and amino acids. Additionally, albumin is as a large amino acid and proteins reservoir in body (3). Total proteins represent the total amount of proteins in blood serum. Protein measurements may reflect the nutritional state (4). Majority of plasmatic proteins is synthesized in hepatocytes, with albumin representing their largest quantitative part (5). Individual protein fractions, or blood serum proteins, have different functions and their identification is used also as a diagnostic tool. The determination of serum proteins has evolved into important diagnostic aids, showing that under either intensive or extensive conditions, kids with higher serum protein concentration than 0.8g/dL during the first 48 hours of life have lower morbidity and mortality rates than kids with lower serum protein levels (6). In many newborn animals, colostrum is the main source of immunoglobulin and other proteins, necessary for the future life (7). Therefore, total proteins, both in colostrum and serum, also contribute profoundly to neonate immunity and growth, not only because of the immunoglobulin content, but possibly also due to other nutritional and physiological effects on the neonates (8). This study was aimed to evaluate of the protein status in blood serum of sheep and goats in Basra province and recording any possible relationship in serum protein levels between animals of different sexes.

Materials and methods

Adult sheep and goats of different sexes and from more than one location in Basra province were randomly selected, the study included 28 animals, 1-2 years old (7 females and 7 males of sheep) and (7 females and 7 males of goats). Animals of study appeared clinically healthy. Blood samples were collected from jugular vein by vacutainer apparatus in tube without anticoagulants, blood samples were kept for 15 minutes at room temperature and then separated by centrifugation at 3000r.p.m for 15 min and stored at -20C° until analysis. Serum concentration of total proteins and albumin were measured by using kits from (Biolabo company, France).

Estimation of total protein (Biuret method):

Total protein was estimated by a colorimetric method using a commercial kit (table 1), in this reaction the peptide bonds of proteins react with Cu^{2+} in alkaline solution to form a colored complex which absorb-ance, and measured 550 nm. The biuret reagent contains sodium potassium tartrate to complex cupric ions and maintains their solubility in alkaline solution (table 1), and calculate the results as follows:

$$\text{Result} = \frac{\text{Abs (assay)}}{\text{Abs (Standard)}} \text{ x Standard concentration}$$

Standard concentration = 6 g/dL

Table (1):The composition of kit in Biuret method

Pipette into well identified tubes	Reagent Blank	Standard	Assay
Reagent 1	1ml	1ml	1ml
Standard		20µl	
specimen			20µl
Demineralized water	20µl		
Mix well let stand for 10 minutes at room temperature. Record absorbance at 550nm (530-570) against reagent blank.			

Estimation of albumin:

The albumin concentration in the specimen was measured by using kits (table 2) (Biolabo, France), in which the buffered solution at pH 4.2, bromocresol green binds albumin to form a colored compound which absorbance, measured at 630 nm (620-640), and calculate the results as follows.

$$\text{Result} = \frac{\text{Abs (assay)}}{\text{Abs (Standard)}} \text{ x Standard concentration}$$

Standard concentration = 5.0 g/dL (725 pmol/L)

Table (2): The composition of albumin kit

Pipette into well identified tubes	Blank	Standard	Assay
Reagent	2ml	2ml	2ml
Demineralized water	10µl		
specimen			10µl
Standard		10µl	
Mix well record absorbance at 630 nm (620-640) within 3 minutes against reagent blank or better after exactly 1 minute.			

Estimation of globulin

The globulins was estimated by subtraction of albumin from total proteins (1).

Statistical analysis

Statistical analysis was conducted according to SPSS (version 13.00). One way analysis of variance (ANOVA) was used to assess the significance of differences between different groups of animals. The data was expressed as Mean± Standard Errors (SE), the P-value <0.05 was considered statistically significant. LSD was carried out to test the significance levels among means of groups (9).

Results

The mean total proteins concentrations in serum of examined ewes in G1 was (6.15 ± 0.32 g/dl), in G2 which had (7) rams was (6.28 ± 0.37 g/dl), and (6.62 ± 0.31 g/dl) in serum of seven does which represent G3, and the total proteins levels in G4 which involved (7) bucks was (6.52 ± 0.12 g/dl) (table 3). The serum albumin in different groups was (3.84 ± 0.37 g/d) in G1, (4.11 ± 0.36 g/dl) in G2, (3.52 ± 0.22 g/dl) in G3, and in G4 was (4.30 ± 0.30 g/dl) (table 3). The serum levels of globulins were (2.31± 0.47g/dl), (2.97 ± 0.47g/dl), (3.10± 0.46g/dl), and (2.22 ± 0.34g/dl) in G1, G2, G3, and G4 respectively (table 3). The statistical analysis showed no significant differences (P>0.05) in the levels of protein, albumin, and globulin among all groups in regarding to sex of animals.

Table (3): Total proteins, albumin and globulins of different groups (M±SE) (n=7).

Groups / Blood components	Total protein g/dl	Albumin g/dl	Globulin g/dl
Group 1 (ewes)	6.15 ± 0.32 A	3.84 ± 0.37 A	2.31± 0.47 A
Group 2 (rams)	6.28 ± 0.37 A	4.11 ± 0.36 A	2.97 ± 0.47 A
Group 3 (does)	6.62 ± 0.31 A	3.52 ± 0.22 A	3.10± 0.46 A
Group 4 (bucks)	6.52 ± 0.12 A	4.30 ± 0.30 A	2.22 ± 0.34 A

Capital letters show no significant differences (P>0.05) among all groups of animals.

Discussion

Results of this study show no significant differences (P<0.05) in levels of total proteins, albumin and globulins between different groups of animals. Sex of animals had no effect on the blood serum protein levels and these results agreed with results of study made by (10) who reported that total proteins, albumin and globulins showed no significant differences between males and females sheep. Serum albumin levels in this study show no significant differences between males and females sheep this result disagreed with that of (11) who reported that sex had a significant effect on albumin levels in sheep and was higher in males than in females. While results of total proteins and globulins in this study agreed with results of (11) who mentioned that sex had no any effect on total proteins and globulins levels in sheep. Total protein levels in goats in the present study show no significant differences between males and females and that was disagreed with that mentioned by (12) who reported that male goats had higher total protein levels compared with that of female goats. While results of total proteins in this study agreed with that of (13) who reported in a study on Landrace Danish goats that there was no significant difference between animals in regard to sex. Albumin concentration in this study was consistent with that mentioned by (12) who reported that albumin levels in goats have not been affected by sex. Results of total protein levels in this study was in agreement with that of (14) who found no significant differences in total protein levels in regard to sex of sheep.

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