Evaluation of some biochemical and Hematological parameters for Changes Associated with Diarrhea in Calves

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ABSTRACT
This study aimed to identify the serological and hematological changes which were associated with diarrhea in calves. The study conducts on 62 calves whose age range from 1 month to 6 months. The experiment started from September 2018 to March 2019. The samples consist of 42 calves with diarrhea and 20 healthy for comparison. Blood samples were taken for blood components and biochemical determination. The study showed a significant increase (p ≤ 0.05) in hemoglobin, PCV and white blood cells (p ≤ 0.01). The biochemical tests showed a significant increase (p ≤ 0.05) in globulin, potassium and phosphorus ions. Significant decrease (p ≤ 0.05) was occurred in albumin and sodium, and no significant changes in total protein level and chloride ions concentration.

Introduction
Diarrhea is an intestinal secretion that interferes with digestion and absorption which is leading to loss of water and electrolytes from the whole body fluids through the intestine; leading to dehydration, many other complicated and in some cases lead to death [1,2]. Diarrhea is also known as gastroenteritis associated with several pathogens that can be infectious or non-infectious. However, diarrhea remains a major problem around the world because of major economic losses associated with the cost of treatment, diagnosis, veterinary intervention and decreasing in livestock is due to delayed growth or mortality, knowledge of causative agents is necessary to avoid the problem and find appropriate solutions [3,4]. Regardless of the cause of diarrhea, the changes associated with it include loss of water and electrolytes, as well as a lack of milk intake, which are intervention with acidity of blood, electrolytes imbalance and a decline in the balance of energy and low level of glucose that relate to disorders of absorption in carbohydrates, fats and amino acids [5,6].

The type of diarrhea depends on the causative agent, which may be microorganisms such as bacteria, viruses, parasites, environmental factors such as cold or very hot weather, management factors such as poor health care, overcrowding and the immune state of animals, especially in the first postpartum period. The calf sensitivity is due to the weakness of mother-to-fetus transmission, either because of the immune system passes through the placenta or colostrum insufficiently also it may be due to the lack of immune system development to eliminate opportunistic pathogens. Moreover, there are nutritional factors associated with an increase in the quantity or quality of given colostrum to calf. Corruption or contamination of the feed material [7,8]. This study focuses on biochemical and hematological changes such as total protein, white blood cell (WBC), hemoglobin (Hb) concentration, packed cell volume (PCV), and electrolyte changes relate to dehydration associated with diarrhea in small calves.

Materials and Methods
Forty-two samples of calves suffer from diarrhea were collected. Their age ranged from 1-6 months, the cases were collected from veterinary clinics in Salah al-Din Governorate and Anbar Governorate during the period from September 2018 to March 2019. A 7 ml of blood samples were collected with 10 ml syringes from jugular vein and divided into two parts 2 ml were put in tubes supplied with anticoagulant (EDTA) for doing blood picture and 5 ml in plain tube to get serum for the chemical tests and left the samples for 20 minutes at room temperature until the clotting occurred and then separated by centrifuge. In addition, 20 blood
samples of healthy animals were collected in the same manner for the purpose of comparing healthy and infected animals. The blood serum test was used for measuring sodium, potassium, phosphorus, globulin, total protein, and albumin by using a spectrophotometer and special kits. Tests were carried out in chemistry laboratory at the College of Veterinary Medicine-University of Tikrit. While blood tests, used the Hemocytometer for WBCs count, Sahli hematometer to measure the Hb concentration, And hematocrit reader to estimate PCV.

Results and discussion

The study showed that there was a significant increase (p ≤ 0.05) in hemoglobin, blood cell volume, white blood cells, phosphorus and potassium and a significant decrease (p ≤ 0.05) in albumin and sodium level were occurred, and no significant changes in chloride concentration and total protein, as shown in Table (1). The results of increasing the concentration of Hb and PCV agrees with [9]. The increasing in blood concentration was due to dehydration and loss of fluid. While increasing of white blood cells may occur due to normal reflux of body defense mechanisms against infections this result is agreement with [10]. Increasing in globulin may occurred as a result of acute inflammation caused by various pathogens in the intestines the result agrees with [11]. The reduction of albumin, which corresponds with [12], may be due to depletion of it by kidney. Results also showed an increase in the level of potassium(K⁺) and this is in agreement with [13] related to the retention of K⁺ ions in the kidneys and re-absorption by renal tubules in response to increase acidity and cell damage, which increases the movement of potassium from intracellular fluid to the outside [14]. Also a significant increase in phosphorus levels agrees with [15] The increase may be due to dehydration that is leading to renal disturbances. The low sodium level agrees with [13]. This occurred from excessive secretion of sodium ions due to weakness of sodium intestinal absorption or increased intestinal motility.

Table (1): Haemato- biochemical changes in healthy and diarrhoeic calves

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Healthy calves</th>
<th>Diarrheal calves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=20</td>
<td>N=42</td>
</tr>
<tr>
<td>Hemoglobin (g%)</td>
<td>9.13</td>
<td>11.14**</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>28.30</td>
<td>34.50**</td>
</tr>
<tr>
<td>WBC (cell/µl)</td>
<td>8.619</td>
<td>10.775*</td>
</tr>
<tr>
<td>Phosphorous (mg/dL)</td>
<td>1.71</td>
<td>4.84**</td>
</tr>
<tr>
<td>Potassium (mmol/L)</td>
<td>5.16</td>
<td>6.26**</td>
</tr>
<tr>
<td>Chloride (mmol/L)</td>
<td>90.8</td>
<td>86.3</td>
</tr>
<tr>
<td>Sodium (mmol/L)</td>
<td>149.45</td>
<td>140.39**</td>
</tr>
<tr>
<td>total protein (g/dL)</td>
<td>6.030</td>
<td>5.950</td>
</tr>
<tr>
<td>Globulin (g/dL)</td>
<td>2.51</td>
<td>3.21*</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>3.525</td>
<td>2.738**</td>
</tr>
</tbody>
</table>

* Significant at p < 0.05, ** Significant at p < 0.01

References


تقييم بعض المعايير الكيميائية والدموية للتغييرات المرافقة للإسهال في العجول
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المختصر
هدفت الدراسة إلى التعرف على التغيرات الكيميائية والدموية التي ترافق الإسهال في العجول. أجريت هذه الدراسة على 62 عجل تتراوح أعمارهم من 1 إلى 6 شهور. بدأت التجربة من أول 2018 إلى أذار 2019. العينات تشمل 42 عجل مصاب بالإسهال و20 عجل سليم للمقارنة. جمعت عينات الدم للختامات الدموية والكيميائية. اظهرت الدراسة زيادة معنوية عند (p≤0.05) في الهيموغلوبين وحجم خلايا الدم المرصودة بينما خللا دم البيض عند مستوى احتمالية (p≤0.01). الاختبارات الكيميائية اظهرت زيادة معنوية عند (p≤0.05) في الغلوبيولين، بوتاسيوم والفسفور. و انخفاض معنوي (p≤0.05) في الكلوريد والصوديوم، ولا توجد تغيرات معنوية في مستوى الكليوريد والبروتينات الكلي.

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