

Comparison the Effect of Ewe and Goat Colostrum Extracts on the Hematological and Biochemical Profiles: Rat as a Model

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Abstract

This study was generated to provide information about the hematological and biochemical changes affected by exposing female rats to colostrum extracts of ewes and goats. As a start, 30 female rats were classified randomly into 3 groups (10 rats/each). The experiment was lasted for 30 days. Until the end of the experiment, a group received ewe colostrum extract (ECE) as 0.1ml orally/daily, another group was given goat colostrum extract (GCE) at 0.1ml orally/daily, the control group (C) was provided with normal saline at 0.1ml orally/daily. After the experiment was done, sacrificing of the tested animals was performed, and blood-based samples were obtained. These blood samples were tested for changes in the blood profiles using certain features such as RBCs counting, hemoglobin (Hb) level, packed cell volume (PCV), WBC counting, glucose (Glu) level, cholesterol (Ch) level, triglycerides (TAG), alkaline phosphatase (AP), alanine transferase (ALT), basophils (B%), eosinophils (E%), monocyte (M%), lymphocyte (L%), and neutrophils (N%). The results recognized significant ($p < 0.05$) effects of the extracts on the RBCs, Hb, PCV, Glu, Ch, and TAG when compared with those in the C group. Furthermore, no significant ($p > 0.05$) differences were provided from such effects on the WBCs, AP, and the ALT when compared with those in the C group. There were significant ($p < 0.05$) effects of the extracts on the L% when compared with that in the C group. However, no significant ($p > 0.05$) differences were provided from such effects on the B%, E%, M%, and N% when compared with those in the C group. No differences were noticed from these effects between both extracts on all those parameters. The study provides very important data about the effects of ewe and goat colostrum extracts on the hematological and biochemical characteristics in female rats that could be further used as supportive information for future studies.

Keywords: Blood, Biochemical, Colostrum, Ewe, Goat, Parameters, Rat.

Introduction

Colostrum is produced from the mammary glands and has some active constituents such as lactalbumin, lactoprotein, lactoferrin, and immunoglobulins. Proteins, growth factors, anti-microbial substances, carbohydrates, fats, oligosaccharides, vitamins, minerals are some of these constituents of colostrum that are not the same constituents of milk [1, 2].

These immunoglobulins are important in developing protection mechanisms in the digestive systems of newborns against microbial infection [3, 4]. Some studies reported that colostrum could help in improving the status of autoimmune diseases [5].

Moreover, these immunoglobulins enhance boosting antibody-mediated immunity in different systems of newborns [6, 7]. In addition, colostrum has some active substances that could help in defending the bodies of newborns against bacterial toxins. It was detected that human colostrum increase protection against A and B toxins of *Clostridium difficile* [8].

It has been found that adding bovine colostrum as a supplement to a therapy against diarrhea in HIV patients led to some improvement [9]. Some reports recorded that bovine colostrum inhibited the type secretion system of *E. coli* attaching process [4]. Some digestive health problems involve increasing

intestinal permeability, some studies found that colostrum reduced this permeability [10]. Multiple studies worked on understanding the content profiles of colostrum and recorded some effects of camel colostrum on different blood and liver parameters [11]. This study was generated to provide information about the hematological and biochemical changes affected by exposing female rats to colostrum extracts of ewes and goats.

Materials and Methods

Experiment Design

As a start, 30 female rats, *Rattus norvegicus*, (age at 10-12 weeks, 180-200mg), obtained from the College of Veterinary Medicine, University of Iraq, Diwaniyah, Iraq, were randomly classified into 3 groups (10 rats/each). The experiment was lasted for 30 days. Until the end of the experiment, a group received ewe colostrum extract (ECE) as 0.1ml orally/daily, another group was given goat colostrum extract (GCE) at 0.1ml orally/daily, the control group (C) was provided with normal saline at 0.1ml orally/daily.

Colostrum Extract

The amount of 30ml of colostrum was placed in a sterile container to be quickly sent to the Lab in the mentioned college above. At 5000rpm for 10min, the colostrum was centrifuged. A filtration process for 2 times

using microfiltration membrane, 0.22µm, was applied on the supernatant.

Blood Profiles

After the experiment was done, sacrificing of the tested animals was performed, and blood-based samples were obtained. These blood samples were tested for changes in the blood profiles using certain features such as RBCs counting, hemoglobin (Hb) level, packed cell volume (PCV), WBC counting, glucose (Glu) level, cholesterol (Ch) level, triglycerides (TAG), alkaline phosphatase (AP), alanine transferase (ALT), (B%), (E%), (M%), (L%), and (N%) [12].

Results

The results identified significant ($p<0.05$) effects of the extracts on the RBCs, Hb, PCV, Glu, Ch, and TAG when compared with those in the C group. Furthermore, no significant ($p>0.05$) differences were provided from such effects on the WBCs, AP, and the ALT when compared with those in the C group. There were significant ($p<0.05$) effects of the extracts on the L% when compared with that in the C group, table 1 and 2.

However, no significant ($p>0.05$) differences were provided from such effects on the B%, E%, M%, and N% when compared with those in the C group. No differences were noticed from these effects between both extracts on all those parameters, Table 1, 2, and 3.

Table 1: Hematological features of ewe and goat colostrum extract effects

Group	RBCs	Hb	PCV	WBCs
ECE	5.13±0.033 a	13.3±0.034 a	42.3±0.33 a	6.53±0.03 a
GCE	5.16±0.088 a	13.4±0.09 a	42.1±0.51 a	6.50±0.057 a
C	4.83±0.034 b	12.4±0.043 b	40±0.033 b	6.53±0.63 a

Table 2: Biochemical features of ewe and goat colostrum extract effects

Group	Glu	Ch	TAG	AP	ALT
ECE	83.2±0.43 a	91.8±0.29 a	58.5±0.23 a	18.74±0.08 a	37.8±0.03 a
GCE	82.9±0.2 a	91.7±0.27 a	58.6±0.30 a	18.72±0.01 a	37.7±0.09 a
C	88.6±0.032 b	95.2±0.03 b	61.1±0.43 b	18.76±0.03 a	37.6±0.08 a

Table 3: Features of ewe and goat colostrum extract on differential white blood cells

Group	B%	E%	M%	L%	N%
ECE	1.21 a	1.55 a	4.8 a	62.3 a	34.3 a
GCE	1.22 a	1.48 a	4.7 a	62.1 a	33.6 a
C	1.23 a	1.45 a	4.8 a	56.3 b	33.4 a

Discussion

Colostrum is produced from the mammary glands and has some active constituents such as lactalbumin, lactoprotein, lactoferrin, and immunoglobulins. Proteins, growth factors, anti-microbial substances, carbohydrates, fats, oligosaccharides, vitamins, minerals are

some of these constituents of colostrum that are not the same constituents of milk [1, 2]. These immunoglobulins are important in developing protection mechanisms in the digestive systems of newborns against microbial infection [3, 4]. Some studies reported that colostrum could help in improving the status of autoimmune diseases

[5]. Moreover, these immunoglobulins enhance boosting antibody-mediated immunity in different systems of newborns [6, 7]. The study found that colostrum of both ewes and goats had effects on some of the parameters tested. Such changes included increases in the levels of RBCs, Hb, and PCV which might indicate healthier production of erythrocytes. This could be reasoned that colostrum contains high amounts of lactoferrin, and it provides changes in the physiological actions maintaining additional iron to increase erythropoiesis [13, 14].

Lactoferrin acts as antioxidant that might have reduced damages in the RBCs and led to increase their numbers [15]. In case of decreasing the concentration of glucose, lactoferrin induces the process of glycolysis

leading to less glucose levels in both groups treated with colostrum. This could be via the presence of a link between glyceraldehyde-3-phosphate dehydrogenase (GAPDH) and lactoferrin as GAPDH enzyme has a function in glycolysis leading to more breakdown of glucose molecules [16, 17]. In case of cholesterol and TAGs, colostrum decreased their levels, and this agrees with [18] who found that bovine colostrum decreased the levels of blood Ch and TAGs in human patients.

The study provides very important data about the effects of ewe and goat colostrum extracts on the hematological and biochemical characteristics in female rats that could be further used as supportive information for future studies.

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