

The effect of pregnancy and lactation on blood biochemical and immunological values in ewes after enterotoxaemia vaccination

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Abstract

The current study was conducted on sixteen ewes at the average age of 2years \pm 1.2month and the average weight of 33.01 \pm 2.4 kg. Animals were divided into two groups: Group A, eight pregnant ewes, and Group B, eight lactating ewes. The group A were subdivided into two groups: pregnant group (P) including 4 ewes and control group (C) including 4 ewes non-pregnant, also group B were subdivided into two groups: lactating group (L) and control group (C) non lactating. The ewes were vaccinated against enterotoxaemia before parturition (about one month). The blood samples were withdrawn from group (A) before one week from parturition and one week after parturition in group B. IgG and IgM proteins concentrations were determined by radial immunodiffusion plate. Plasma levels of urea, ALT, GGT, K and creatinine were determined using Reflatron apparatus. The results revealed non-significant differences in values of urea between pregnant (0.59 \pm 0.05) and control group (0.81 \pm 0.15), as well as, there were no significant differences ($P>0.05$) between pregnant group (0.59 \pm 0.05) and lactating group (0.5 \pm 0). The values of K+, GGT and ALT didn't appear any significant differences ($P>0.05$) between pregnant group and control group, while there was significant difference ($P\leq 0.05$) between levels of K +, GGT and ALT of pregnant group (7.58 \pm 1.7, 4.26 \pm 0.61 and 55.93 \pm 0.7) and lactating group (5.91 \pm 0.47, 9.61 \pm 0.81 and 63.18 \pm 0.72) respectively. The levels of bilirubin in pregnant group (3.05 \pm 0.12) appear significant differences ($P\leq 0.05$) as compared with control group (0.74 \pm 0.03), as well as no significant difference between pregnant and lactating group (3.05 \pm 0.12 and 3.05 \pm 0.12) respectively. Serum IgG and IgM concentrations in pregnant was significantly increased (695.073 \pm 0.64mg/dl, 786.005 \pm 0.46mg/dl) respectively while in lactating group was (541.013 \pm 0.32mg/dl, 786.005 \pm 0.46mg/dl) respectively.

Key words: pregnant ewes, lactating ewes, biochemical values, immunological values, enterotoxaemia vaccination.

تأثير الحمل و الرضاعة على المعايير البايوكيميائية والمناعية في الأغنام بعد تطعيمها ضد التسمم المعوي

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الخلاصة

أجريت الدراسة الحالية على ستة عشر نعاج متوسط عمرها سنتان وبمتوسط وزن 33.01 كجم \pm 2.4 و قسمت الحيوانات إلى مجموعتين: المجموعة الأولى ثمانية نعاج حوامل ، و المجموعة الثانية ثمانية نعاج مرضعة. المجموعة (A) تم تقسيمها إلى مجموعتين: مجموعة النعاج الحوامل (P) تضمنت 4 نعاج و المجموعة الضابطة (C) 4 نعاج غير حوامل ، كما تم تقسيم المجموعة (B) إلى مجموعتين : المجموعة مرضعات (L) ومجموعة التحكم (C) غير المرضعات . تم تلقيح النعاج ضد لقاح التسمم المعوي قبل الولادة (حوالي شهر واحد). تم سحب عينات دم من المجموعة

(A) قبل أسبوع واحد من الولادة و بعد الولادة أسبوع واحد في المجموعة B. مفتش و الكلوبولين المناعي تم تحديد تركيزات البروتينات بواسطة شعاعي لوحة المناعي . تم تحديد مستويات البلازما من اليوريا ، ALT ، GGT ، K و الكرياتينين باستخدام جهاز الرفراترون. أظهرت النتائج أنه لا توجد فروق ذات دلالة إحصائية في القيم اليوريا بين الحوامل (0.05± 0.59) و المجموعة الضابطة (0.15± 0.81) ، وكذلك ، لم تكن هناك فروق ذات دلالة إحصائية ($P > 0.05$) بين مجموعة الحوامل (0.05± 0.59) و مجموعة المرضعات (0± 0.5). لم تظهر قيم K + GGT و ALT أي فروق ذات دلالة إحصائية ($P > 0.05$) بين مجموعة الحوامل و المجموعة الضابطة ، بينما كانت هناك فروق معنوية ($P \leq 0.05$) بين مستويات K + GGT ، ALT و مجموعة الحوامل (0.72± 63.18 و 9.61 ± 0.81 ، 0.47 ± 5.91) تظهر مستويات البيليروبين في مجموعة الحوامل (0.12± 3.05) فروق ذات دلالة إحصائية ($P \leq 0.05$) بالمقارنة مع مجموعة المراقبة (0.74 ± 0.03) ، وكذلك لا يوجد فرق كبير بين مجموعة الحوامل و المرضعات (0.12± 3.05 و 0.12± 3.05) على التوالي. تم زيادة تركيزات مصل مفتش في الحوامل بشكل ملحوظ في (695.073 ± 0.64mg/dl) ($P \leq 0.05$) ، في حين كان في مجموعة المرضعات (541.013 ± 0.32 mg/dl) ، الفارق كبير بين مجموعة الحوامل و المرضعات تركيز الغلوبولين المناعي كشفت زيادة كبيرة ($P \leq 0.05$) في المجموعة الحوامل (786.005 ± 0.46 mg/dl) ، في حين كان التركيز في مجموعة المرضعات (722.032 ± 0.29 mg/dl) بالمقارنة مع مجموعة السيطرة (365.045 ± 0.31 mg/dl). الكلمات المفتاحية: نعا حوامل ، نعا مرضعة ، معايير البايوكيميائية ، المعايير المناعية ، التسمم المعوي.

Introduction

Metabolism in animals is greatly modified by normal physiological status like pregnancy and lactation (1 and 2). Blood serum chemistry levels during pregnancy are affected by maternal tissues also affected by several other factors as breed, age, malnutrition, fetal growth, or season (3 and 4). The protein requirement increased during pregnancy and lactation, while the renal urea clearance decreases in pregnant and lactating sheep when blood plasma urea levels increased during week 10 of pregnancy, reaching a peak at parturition (5 and 6). The immune response in healthy animals is effective ,but it also affected by physiological status ,like estrus ,pregnancy, parturition and lactation which them represent as stressor factors (5). Humeral and cellular immune response become inhibited ,therefore, the immune response to vaccine under the stressor physiological factors could be in moderate level or sometimes suppressed. Many researchers noted the relationship between the immunization and pregnancy and lactation such as Reynolds and Griffin (7) which showed that the levels of immunoglobulin M (IgM) increased and persisted in response to bovine serum albumin (BSA) during pregnancy, while Secondary immunoglobulin G1 (IgG1) titers were significantly impaired in late pregnancy and during lactation and the lower levels of immunoglobulin G2 (IgG2) were unaffected

by pregnancy under these experimental conditions. The aims of the study were to correlation between the immunity situation and the biochemical parameters of blood in vaccinated ewes before and after parturition.

Materials and methods

The study was carried out on sheep located in Al-Diwanyia. For the study a group of sixteen ewes at the average age of 2years ±1.2month and the average weight of 33.01±2.4 kg were used. The animals were all in good nutrition and health status. The animals were divided into two groups: Group A (pregnant), eight ewes, and Group B (lactating), eight ewes. The group A were subdivided into two groups: pregnant group (P) including 4 pregnant ewes and control group (C) including 4 non pregnant ewes, also group B were subdivided into two groups: lactating group (L) including 4 lactating ewes and control group (C) including 4 non lactating ewes. The ewes were vaccinated against enterotoxaemia vaccine (Ultra choice 8 Pfizer animal health Co. USA 1ml S.C) before parturition (about one month). The blood samples were withdrawn from group (A) before one week from parturition and one week after parturition in group B. Blood was immediately centrifuged at 3000 rpm for 10 minutes at 25°C of temperature and the

obtained plasma was stored at 8°C. IgG and IgM concentrations were determined by radial immunodiffusion plate (**IgG RID**). Plasma levels of urea, ALT, GGT, K and Creatinine were determined using Reflatron apparatus. Data were submitted to statistical analysis (ANOVA) using SPSS software.

Results

The results revealed that there were no significant differences in values of urea between pregnant (0.59±0.05) and control group (0.81±0.15), as well as, there were no significant differences (P>0.05) between pregnant group (0.59±0.05) and lactating group (0.5±0). The values of K+, GGT and ALT didn't appear any significant differences (P>0.05) between pregnant group and control group, while there was significant difference (P≤ 0.05) between levels of K +, GGT and ALT of pregnant group (7.58 ± 1.7, 4.26 ± 0.61 and 55.93 ± 0.7) and lactating group (5.91 ± 0.47, 9.61 ± 0.81 and 63.18 ± 0.72) respectively. The levels of bilirubin in

pregnant group (3.05 ± 0.12) appear significant differences (P≤ 0.05) as compared with control group (0.74 ± 0.03), as well as no significant difference between pregnant and lactating group (3.05 ± 0.12 and 3.05 ± 0.12) respectively (table 1a &b). Serum IgG concentrations in pregnant was significantly increased at (P≤ 0.05) (695.073±0.64mg/dl) as compared with control group (377.011±0.42mg/dl), while in lactating group was (541.013±0.32mg/dl), which also revealed significant increase (P≤ 0.05) as compared with control group (312.021±0.33mg/dL); and the results indicate slightly significant difference between pregnant group and lactating group (P<0.05). Serum IgM concentration was revealed significant increase (P≤ 0.05) in pregnant group (786.005±0.46mg/dl) than control group (430.011±0.32mg/dl), while the concentration of lactating group was (722.032±0.29mg/dl) as compared with control group (365.045±0.31mg/dl).

Table (1-a): The values of some blood parameters of non and pregnant ewes (mg/dl or mavl/l).

Parameters Groups	Urea mg/dl	Creatinine mg/dl	K mavl/l	GGT	ALT U/l	Bilirubin mg/dl
Control n=4	0.81±0.15 ^a	24.68 ± 3.7 ^a	7.53 ± 1.13 ^a	5.39 ± 1.2 ^a	54.33 ± 0.44 ^a	0.74 ± 0.03 ^a
Pregnant n=4	0.59±0.05 ^a	13.77 ± 0.53 ^b	7.58 ± 1.7 ^a	4.26 ± 0.61 ^a	55.93 ± 0.7 ^a	3.05 ± 0.12 ^b

The data were expressed as (Means ±SE). Different letters refers to significant differences among group at (p ≤ 0.05).

Table (1-b): The values of some blood parameters of non and lactating ewes (mg/dl or mavl/l).

Parameters Groups	Urea mg/dl	Creatinine mg/dl	K mavl/l	GGT	ALT U/l	Bilirubin mg/dl
Control n=4	0.78±0.16 ^a	7.87 ± 2.1 ^a	2.84 ± 0.33 ^a	6.65 ± 0.51 ^a	54.33 ± 0.44 ^a	0.76 ± 0.01 ^a
Lactating n=4	0.5±0 ^a	13.27 ± 0.43 ^b	5.91 ± 0.47 ^b	9.61 ± 0.81 ^b	63.18 ± 0.72 ^b	3.05 ± 0.12 ^b

The data were expressed as (Means ±SE). Different letters refers to significant differences among group at (p < 0.05).

Table (2): Serum IgG and IgM concentrations in pregnant and lactating ewes (mg/dl).

Immunoglobulin concentrations		IgG (mg/dL)	IgM (mg/dL)
Group A	P(n=4)	695.073±0.64 ^b	786.005±0.46 ^{bc}
	C(n=4)	377.011±0.42 ^a	430.011±0.32 ^a
Group B	L(n=4)	541.013±0.32 ^b	722.032±0.29 ^{bc}
	C(n=4)	312.021±0.33 ^a	365.045±0.31 ^a

The data were expressed as (means ±SE). Different letters (a&b) refers to significant differences among the same group at (p < 0.05). The letter (c) refers to significant differences between different groups at (P<0.05).

Discussion

Our results were differs from (8) that showed presence of significant differences among parameters analyzed during different times including pregnancy, post-parturition and from these parameters urea revealed significant differences and it is not excluded that morphological and/or functional changes in the kidney occurring during pregnancy and lactation may have induced increased renal re-absorption of urea (9), also differs from (10) that indicate ALT levels didn't record any significant differences between pregnant and lactating ewes, that indicate the liver and kidney functioning not affected negatively but can differ from that in control group as compensatory mechanism but not illness, while compared with (11) that indicate no significant differences among K⁺ levels in lactating ewes. The K⁺ levels in lactating animals less than in pregnant ewes due to

excrete more amount in milk as well as via saliva, urine, feces and by sweating. The qualitative changes in antibody titer observed following primary injection of bovine serum albumin that resemble the injection of vaccine during pregnancy may be interpretation by alterations in regulatory T-cell function or effector B-cell activity would most readily explain, also impairment of immunological memory following primary immunization during pregnancy (7) and (12). The humoral immune response in pregnant group higher than in pregnant animals due to increase level of corticoids in blood of lactating ewes as resultant of continuous exposure into stress factor as lamb feeding and reproductive system modifications after lambing which lead into inhibit memory cells and other immune cells as anti-bodies producing cells .

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