

Journal of Applied Animal Research

ISSN: 0971-2119 (Print) 0974-1844 (Online) Journal homepage: https://www.tandfonline.com/loi/taar20

Plasma and Amniotic Fluid Nitric Oxide Level and Adenosine Deaminase Activity in Sheep

O. Atakisi , E. Atakisi , S. M. Pancarci & A. Ozcan

To cite this article: O. Atakisi , E. Atakisi , S. M. Pancarci & A. Ozcan (2009) Plasma and Amniotic Fluid Nitric Oxide Level and Adenosine Deaminase Activity in Sheep, Journal of Applied Animal Research, 35:2, 197-199, DOI: 10.1080/09712119.2009.9707017

To link to this article: https://doi.org/10.1080/09712119.2009.9707017

Copyright Taylor and Francis Group, LLC

Published online: 15 Nov 2011.

Submit your article to this journal

Article views: 148

View related articles

Citing articles: 1 View citing articles

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=taar20

J. Appl. Anim. Res. 35 (2009) : 197-199

Plasma and Amniotic Fluid Nitric Oxide Level and Adenosine Deaminase Activity in Sheep

O. Atakisi[1*], E. Atakisi[1], S.M. Pancarci[2], A. Ozcan[1]

[1]Department of Biochemistry

[2]Department of Gynecology and Reproduction

Faculty of Veterinary Medicine
University of Kafkas
36100, Kars, Turkey

(Received May 17, 2008, accepted November 16, 2008)

Abstract

Atakisi, O., Atakisi, E., Pancarci, S.M. and Ozcan, A. 2009. Plasma and amniotic fluid nitric oxide level and adenosine deaminase activity in sheep. J. Appl. Anim. Res., 35: 197-199.

The objective of this study was to determine nitric oxide (NO) levels and adenosine deaminase (ADA) activities in plasma of pregnant (10) and non-pregnant (10) ewes and amniotic fluid at parturition in ewes. Plasma ADA activity was highest in pregnant ewes (P<0.001), whereas, NO level was highest in amniotic fluid. This is the first study to report ADA activities and NO levels in amniotic fluid of healthy pregnant ewes at parturition. The future studies are warranted to clarify the role of ADA activities and NO levels in amniotic fluid in relation to pregnancy and parturition.

Key words: Ewe, adenosine deaminase, nitric oxide, amniotic fluid, pregnancy.

Introduction

Nitric Oxide (NO) is an important regulatory agent in various female reproductive events ranging from ovulation to delivery. Mechanisms for the initiation of parturition are not known exactly. For the parturition process, relaxant effect of NO on uterine longitudinal smooth muscle cells has been recently hypothesized (Marinoni *et al.*, 2000). In one study, it was reported that NO metabolite concentrations were increased in response to intra-amniotic infections (Egberts *et al.*, 1999). Although increase in NO metabolites during pregnancy in maternal serum has been reported (Atakisi and Ozcan, 2005), there is no adequate data with regard to NO metabolism in fetus.

Adenosine deaminase (ADA) is considered as an important marker for cell mediated immunity (Kose *et al.*, 2001). Pregnancy has been associated with depressed cellular immunity. Therefore, ADA activity may be changed during pregnancy. Some studies indicated increased plasma ADA activity (Lee *et al.*, 2007), whereas, some others reported decreased plasma ADA activity in normal pregnancy (Yoneyama *et al.*, 2002; 2003).

Amniotic fluid plays an important role in pregnancy and foetal development. There is no

*For correspondence : Tel: +90 474 242 6800 ext:1160; Fax:+90 474 242 6853; E-mail: onuratakisi@hotmail.com

J. Appl. Anim. Res. 0971-2119/2009/$10.00 © GSP, India.

study available regarding alterations of ADA activity and NO concentrations in amniotic fluid at parturition in ewes. Therefore, it is aimed to investigate NO levels and ADA activity in amniotic fluid and plasma in pregnant ewes close to parturition and non pregnant ewes.

Materials and Methods

Blood samples were collected from 2.5-3 years old non-pregnant (10) and pregnant (10) fat tailed ewes within the last 3d prior to parturition. Separated plasma was stored at -40C until further analysis. Amniotic fluids were collected with sterile syringe at parturition via amniotic puncture. Samples were centrifuged immediately at 18000×g for 10 min and stored at -40C until further analysis.

ADA activity in plasma and amniotic fluid were determined at 37C according to the method of Giusti and Galanti (1984) based on the Bertholet reaction. NO levels in plasma and amniotic fluid were measured by the method of Miranda *et al.* (2001). Data were analysed using one way ANOVA (SPSS 10.0).

Results and Discussion

ADA activity in pregnant ewes (19.1±1.0 u/l) was higher in plasma (P<0.001) than in nonpregnant ewes (13.3±0.7 u/l) and in amniotic fluid (12.1±1.0 u/l) at parturition. In contrast to our result, Alan *et al.* (2002) reported that ADA activity in normal pregnancy decreased compared to non-pregnant ewes and may be an indication of normal pregnancy and could be used for clinical diagnosis of pregnancy and monitor the well-being of pregnancy.

Higher ADA activities were found in the plasma, which was collected prior to parturition in the current study. This higher ADA activity could be attributable to termination of the immune system supression during pregnancy. The mechanism of alterations in plasma ADA activity during pregnancy is not clearly known. However, studies reported that ADA concentrations in the serum might be a marker of depressed cell-mediated immunity in pregnancy (Yoneyama *et al.*, 2002). Yoneyama *et al.* (2003) reported that lymphocytes or monocyte-macrophage cell system may contribute to changes in ADA during normal pregnancy (Yoneyama *et al.*, 2003). Since this is the first report regarding ADA activity in amniotic fluid in ewes, there is no available data to compare with our result.

Plasma NO levels in pregnant ewes (19.9±1.1μM) were higher (P<0.001) than in nonpregnant ewes (12.9±0.7μM), whereas, NO levels in amniotic fluid at parturition (103.6±6.9μM) were higher (P<0.001) as compared to both pregnant and non pregnant ewe's plasma. Increase in NO and its metabolites (NOx) through induction of eNOS and mRNA during pregnancy has been reported (Magness *et al.*, 2001). High plasma NO concentrations before delivery in this study may indicate the increasing demand for enhanced blood supply due to fetal development and parturition process. It was claimed that NO activates guanilate cyclase leading to the increased level of cyclic guanosine 3′, 5′-monophosphate (cGMP). The increased levels of cGMP cause relaxation of smooth muscle cells of the uterus leading to parturition (Marinoni *et al.*, 2000; Maul *et al.*, 2003). Marinoni *et al.* (2000) reported that iNOS in feto-placental tissues of women could lead to the release of NO inducing cervical dilatation at parturition. Sheppard *et al.* (2001) found an increase in NO concentration in amniotic fluid of ewes towards the end of gestation (130th and 142nd d of gestation). The authors postulated that nitrate and nitrite (NOx) could be increased in conjuction with feto-placental eNOS and amniotic fluid cGMP. Furthermore, they reported that NO-induced vasodilatation is regulated by fetal growth during the third trimester and these alterations were significant between 120th and 130th d of pregnancy in ewes.

In conclusion, this is the first study reporting the ADA activities and NO levels in

amniotic fluid of normal healthy ewes. The future studies are needed to elucidate the role of alterations in ADA activities and NO level in amniotic fluid in relation to pregnancy and parturition.

References

Alan, M., Agaoglu, Z.T., Uyar, A. and Altug, N. 2002. Serum adenosine deaminase levels in different periods of pregnancy in ewes. Turk J. Vet. Anim. Sci., 26: 487-490.

Atakısı, O. and Ozcan, A. 2005. Investigation of reduced glutathione (GSH), malondialdehyde (MDA) and nitric oxide (NO) levels in ewes receiving zinc during the period of pregnancy. Kafkas Univ. Vet. Med. J., 11: 141-146.

Egberts, J., Van Den Bosch, N. and Soederhuýzen, P. 1999. Amniotic fluid nitric oxide metabolites, cyclic guanosine 3',5' monophosphate and dimethylarginine in alloimmunized pregnancies. Eur. J. Obstet. Biol., 85: 209-214.

Giusti, G. and Galanti, B. 1984. Methods of enzymatic analysis. In: *Adenosine Deaminase: Colorimetric Method,* Ed. H.U. Bergmeyer, Verlac Chemie, Weinheim, pp. 315-323.

Kose, K., Yazıcı, C. and Ascioglu, O. 2001. The evaluation of lipid peroxidation and adenosine deaminase activity in patients with Behcet's disease. Clin. Bioch., 34: 125-129.

Lee, S.J., Hwang, H.S., Kım, B.N., Kım, M.A., Lee, J.W., Park, Y.W. and Kim, Y.H. 2007. Changes in serum adenosine deaminase activity during normal pregnancy. J. Korean. Med. Sci., 22: 718-721.

Magness, R.R., Sullıvan, J.A., Tı, Y., Phemetton, T.M. and Bırd, I.M. 2001. Endothelial vasodilator production by uterine and systemic arteries. VI. Ovarian and pregnancy effects on eNOS and NOx. Amer. J. Physiol. Heart Circ. Physiol., 280: 1692-1698.

Marınonı, E., Dı Iorıo, R., Vıllaccıo, B., Alberını, A., Rota, F. and Cosmı, E.V. 2000. Amniotic fluid nitric oxide metabolite levels and nitric oxide synthase localization in feto-placental tissues are modified in association with human labor. Eur. J. Obstet. Gynecol. Reprod. Biol., 89: 47-54.

Maul, H., Longo, M., Saade, G.R. and Garfield, R.E. 2003. Nitric oxide and its role during pregnancy: From ovulation to delivery. Current Pharmaceutical Design, 9: 359-380.

Mıranda, K.M., Espey, G.M. and Wınk, D.A. 2001. A rapid, simple spectrophotometric method for simultaneous detection of nitrate and nitrite. Nitric Oxide, 5: 62-71.

Sheppard, C., Shaw, C.E., Lı, Y., Bırd, I.M. and Magness, R.R. 2001. Endothelium-derived nitric oxide synthase protein expression in ovine placental arteries. Biol. Reprod., 64: 1494-1499.

Yoneyama, Y., Sawa, R., Suzukı, S., Yoneyama, K., Doı, D. and Arakı, T. 2002. Relationship between adenosine deaminase activity and cytokine-secreting T cells in normal pregnancy. Obstet. Gynecol., 100: 754-758.

Yoneyama, Y., Suzukı, S., Sawa, R., Otsubo, Y., Mıura, A., Kuwabara, Y., Ishıno, H., Kıyokawa, Y., Doı, D., Yoneyama, K. and Arakı, T. 2003. Serum adenosine deaminase activity and its isoenzyme pattern in women with normal pregnancies. Arch. Gynecol. Obstet., 257: 205-207.

ओ. अताकीसी, ई. अताकीसी, एस.एम. पंकार्सी, ए. ओज्कान। भेड़ों में प्लाज्मा और उल्वीय द्रव नाइट्रिक आक्साइड का स्तर एवं एडिनोसीन डिएमिनेज क्रियाशीलता।

इस अध्ययन का उद्देश्य गर्भित (10) और अगर्भित (10) भेड़ों के प्लाज्मा तथा प्रसव पर उल्वीय द्रव में नाइट्रस आक्साइड (नाआ) का स्तर और एडिनोसिन डिएमिनेज की क्रियाशीलता (एडिक्रि) ज्ञात करना था। गर्भित भेड़ों के प्लाज्मा में एडिक्रि सर्वाधिक थी, जब कि उल्वीय द्रव में नाआ सर्वाधिक था। प्रसव पर स्वस्थ गाभिन भेड़ों के उल्वीय द्रव में एडिक्रि और नाआ स्तर की यह पहली रपट है। गर्भावस्था और प्रसव के संबंध में उल्वीय द्रव में एडिक्रि और नाआ स्तर के कार्य को स्पष्ट करने के लिए और अध्ययन की आवश्यकता है।