Global Veterinaria 7 (5): 478-481, 2011
ISSN 1992-6197

Antioxidant Concentration Status in the Serum of Cows with Left Displacement Abomasom

[1]A. Hasanpour, [2]N. Saranjam and [1]B. Amuoghli Tabrizi

[1]Department of the Clinical Sciences,
Veterinary Medicine Faculty, Tabriz Branch, Islamic Azad University, Tabriz, Iran
[2]Graduated from Veterinary Medicine Faculty, Tabriz Branch, Islamic Azad University, Tabriz, Iran

Abstract: This study was conducted on 30 heads of cows affected with the left displacement of the abomasum (LDA) and 30 heads of healthy cows in order to examination of sera concentrations of the selenium, glothation peroxides and vitamin E in these two groups. LDA affected cattle were conformed on the basis of clinical and laboratory symptoms, some bell sound in the left side and punction from the sound site and determining pH of the fluid which will be acidic in the LDA. The control group cattle also were selected from similar environmental, managerial and feeding condition. The blood sample from the jugular vein was collected and after the serum separation, the vitamin E levels in serum was measured by chromatography fluorimetry, selenium was measured by atomic absorption and Glutathione peroxides was calculated by biochemical kit. The mean level of selenium in the serum in affected and control groups were 26.44±1.02 and 31.23±0.98 ng/ml, respectively and there was significant difference between them ($P<0.05$). The mean level of vitamin E in these groups were 2.73±0.23 and 4.72±0.19 ng/ml, respectively in which there was significant difference between two groups ($P<0.05$). The mean activity level of Glutathione peroxides in affected group (61.7±1.46 Mu/mg) was higher than the control group (61.56±1.67 Mu/mg), nonsignificantly. Correlation between calculated parameters in control group was not significant but in affected group correlation between vitamin E and Glutathione peroxides was significant ($p<0.05$ and $r = 0.421$).In conclusion, anti oxidants' serum level in affected cattle is lower than the healthy cattle and must be used the supplementary containing selenium and vitamin E in the form of injection or additive in feeding for the affected cattle.

Key words: Cow · Antioxidant Concentration · Serum · Left Displacement Abomasom

INTRODUCTION

Displacement of abomasum (DA) and especially the left displacement abomasum (LDA) is one of the widespread disease in dairy cattle due to high carbohydrate in their diet and disorder of movements of abomasum. Studies on clinical and laboratory status of affected cattle of DA would have a significant role on control and prevention the complications of the disease. The disease causes many biochemical changes in serum which has been practice more or less in other studies [1, 2].

Displacement abomasum as a stressful factor has been specified with an oxidative activity and examination of the serum antioxidants' status in these cattle has a special importance. On the other hand, Glutathione peroxides and vitamin E and selenium have been found as basic antioxidants of serum [3, 4]. If the status of serum antioxidants are recognized in these affected cattle, it would be resulted that how much of antioxidants like vitamin E or vitamin C in the injection or oral forms can prevent the complications of the disease. So the aim of this study was the examination of the serum antioxidants in the cattle with LDA and comprising with healthy cattle.

MATERIALS AND METHODS

This was a descriptive study which was done on 30 heads of affected cow to LDA and 30 heads of healthy cow as control group in dairy farms around Tabriz. The cows with LDA were confirmed on the basis of clinical and laboratory symptoms, some bell sound in the left side

Corresponding Author: A. Hasanpour, Department of the Clinical Sciences, Veterinary Medicine Faculty, Tabriz Branch, Islamic Azad University, Tabriz - Iran.

and punction from the sound site and determining pH of the fluid which will be acidic in the LDA. The control group cattle also were selected from similar environmental, managerial and feeding condition. The blood sample from the jugular vein was collected and after the serum separation, the concentration of selenium in the serum was measured by atomic absorption and the activity of Glutathione peroxides in the serum was measured by biochemical kit and vitamin E levels in serum was measured by chromatography fluorimetry. The mean of results were calculated and compared with each other by t-Test in SPPS-17 [5].

RESULTS

The mean level of selenium in affected and control groups were 26.44±1.02 mg/ml and 31.23±0.98 mg/ml, respectively and there was significant difference (P<0.05) between two groups.

The mean level of vitamin E in affected and control groups were 2.73±0.23 mg/ml and 4.72±0.19 mg/ml respectively, in which the mean of vitamin E level in control group was more than its level in affected group significantly (P<0.05).

The mean level of a Glutathione peroxides activity in serum in the affected and control groups was 61.7±1.46 mU/mg and 61.56±1.67 mU/mg, respectively, which there was no significant difference in statistical comparison.

It was found that correlation among calculated parameters in control group was not significant.

In affected cows it is found that was no significant correlation between sera concentration of selenium and vitamin E (r = 0.072) also there is no significant correlation between sera concentration of selenium and Glutathione peroxides activity in serum (r = 0.211), but correlation between Glutathione peroxides activity in serum and sera concentration of vitamin E was significant (r = 0.421, P<0.05).

Table 1: Comparison of the mean level of selenium in affected and control groups

Group	Mean	Standard deviation	P value
Affected LDA	26.44	1.02	0.001
Control	3.23	0.98	

Table 2: Comparison of the mean level of vitamin E in serum in the affected and control cattle

Group	Mean	Standard deviation	P value
Affected with LDA	2.73	0.23	0.000
Control	4.72	0.19	

Table 3: Comparison of the mean level of Glutathione peroxides activity in serum in the affected and control groups

Group	Mean	Standard deviation	P value
Affected with LDA	61.07	1.46	0.826
Control	61.56	1.67	

Table 4: Correlation among measured serumic parameters in control group

Correlation	Correlation Coefficient	P value
Correlation between selenium and vitamin E	0.204	0.289
Correlation between selenium and Glutathione peroxides activity	0.237	0.216
Correlation between vitamin E and Glutathione peroxides activity	0.340	0.071

Table 5: Correlation among measured serumic parameters in affected group

Correlation	Correlation Coefficient	Pvalue
Correlation between selenium and vitamin E	0.072	0.704
Correlation between selenium and Glutathione peroxides activity	0.211	0.263
Correlation between vitamin E and Glutathione peroxides activity	0.421	0.020

DISCUSSION

The mean level of selenium in serum in the affected cows was significantly less than its level in control group (P<0.05). Displacement of abomasum is one of the postpartum diseases which cause stress in cattle and the resultant stress cause to increase the serum oxidants and to decrease serum anti oxidants. Selenium is one of the components of antioxidants which are used in oxidative disease. The decreasing of selenium in serum in cows with LDA is accountable. Also it was found in this study that vitamin E of serum in affected cattle is less than control group significantly. The role of vitamin E as an antioxidant has been considered previously and decreasing of this vitamin in serum is confirmed in displacement abomasums, because of its high usage as an antioxidant is explainable.

In affected cows mean level of Glutathione peroxides activity in serum was less than its level in control group but the variance between two groups was not significant. Glutathione peroxides is an antioxidant enzyme which changes by increasing or decreasing of selenium sera concentration and in this study the similar result was obtained. Glutathione peroxide is used as an antioxidant for most of oxidative reactions.

In the control group the correlation between sera concentration of selenium and vitamin E, sera concentration of selenium and Glutathione peroxides activity, sera concentration of vitamin E and Glutathione

peroxides activity examined and it was found that there was no significant correlation among calculated parameters (r = 0.204, r = 0.237,r = 0.340,respectively). It was found that in affected cows there was no significant correlation between sera concentration of selenium and vitamin E, sera concentration of selenium and Glutathione peroxides activity (r = 0.072,r=0.211,respectively) but correlation between Glutathione peroxides activity and sera concentration of vitamin E is significant ($r = 0.421$, $p < 0.05$).

Hogen *et al.* in a study defined that in affected cattle by mastitis the sera concentrations of vitamin E and selenium were lower than healthy cattle and ante partum vitamin E and selenium injection can prevent mastitis, because selenium increase the movement of chemotactic neutrophyls forward to udder [6]. In another study on lambs it was found that the lambs affected by infectious disease have less vitamin E in their serum and the use of vitamin E and selenium as complementary would be useful [7]. Nayyer *et al*. defined that some diseases like remaining placenta, mastitis, displacement abomasum which are postpartum diseases cause the stress so serum antioxidants decrease and for promoting the efficiency of these cows, antioxidants must be used as injection or as additive in feed [8]. In another study it was found that in infectious diseases oxidants increase and for their prevention antioxidants must be used [9]. Cerri *et al* [10]found that with regarding to stress happening postpartum the usage of vitamin E complementary and selenium would be helpful. In this study they specified that with injection of vitamin E and selenium the serum cortisol level will decrease . The use of vitamin E and selenium supplementation in crossbred dairy cattle cause to decreasing concentrations of plasma cortisol and erythrocyte lipid peroxides and the incidence of retained fetal membranes [11].With measuring of Glutathione peroxides rate and superoxid desmotase in placenta by electrophoresis characterized that the level of this was lower in the cattle with mastitis, uteritis and digestive problems [12]. Larry smith *et al*. [13] by studying on 80 heads cattle characterized that in the heads with high rate of mastitis the selenium, vitamin E and Glutathione peroxides levels of serum was low and they could diminish mastitis by injection of complementary comprised of selenium and vitamin E . Pavlata *et al.* by the studying on cattle and their calves characterized that the sera concentration of selenium defined their calves' selenium level of serum. They reported its serum level 41.13 ± 11.08 mg/l in cattle and 61.63 ± 8.2 mg/l in their calves [14]. By injection of vitamin E and selenium the immunity level of colostrum, colostrums' selenium and thyroid hormones increased which is very useful in transferring immunity to calves [14]. Pavlata *et al*. [16] reported the mean level of vitamin E in the serum 3.55 ± 2.24 mg/l, also they confirmed vitamin E deficiency in 77.7% of calves and by injection of vitamin E and selenium for 2 times (day zero and day seven calves' selenium and vitamin E levels increased . Harapin *et al*. [17] in the study on dairy cattle confirmed that averaging the correlation between selenium and Glutathione peroxides it could be assumed selenium deficiency and by specifying of coefficient the deficiency will be distinguishable . The conclusion is that in affected cows by displacement abomasum the serum level of antioxidants decreases and for preventing the oxidative complications during treatment it must be emphasized on using antioxidants in the injection form or additive form in their diet.

REFERENCES

1. Radostis, O.M. C.C. Gay, D.C. Blood, K.W. Hinchcliff and W.B. Louis, 2007, Veterinary Medicine, 10th ed. St. Sau. Nders. pp: 1877.
2. Smith, K.L. J.H. Harrison, D.D. Hancock, D.A. Todhunter and H.R. Conrad, 1984. Effect of vitamin E and selenium supplementation on incidence of clinical mastitis and duration of clinical symptoms. J. Dairy Sci. 67: 1293-1300.
3. Chaiyotwittayakun, A. R.J. Erskine, P.C. Bartlett, T.H. Herdt, P.M. Sears and R.J. Harmon, 2002. The effect of ascorbic acid and L-histidine therapy on acute mammary inflammation in dairy cattle. J. Dairy Sci. 85: 60-67.
4. Jukola, E. J. Hakkarainen, H. Saloniemi and S. Sankari, 1996. Blood selenium, vitamin E, vitamin A and B carotene concentrations and udder health, fertility treatments and fertility. J. Dairy Sci. 79: 838-845.
5. Norbert, K. and L. Chirase, 2004. Effect of transport stress on respiratory disease, serum antioxidant status and serum concentrations of lipid peroxidation biomarkers in beef cattle, Am. J. Vet. Res. 65: 860-864.
6. Hogan, J.S. and W.P. Weiss, K.L. Smith, 1993, Role of vitamin E and selenium in host defense against mastitis. J. Dairy Sci. 76: 2795-2803.
7. Hatfield, P.G. J.T. Daniels, R.W. Kott, D.E. Burgess and T.G. Evans, 2000. Role of supplemental vitamin E in lamb survival and production:A review. Proceedings of the American Society of Animal Sci.,

8. Nayyar, S. and R. Jindal, 2010. Essentiality of antioxidant vitamins for ruminants in relation to stress and Reproduction, Research, Shiraz University, Vol 11, No.1, Ser. No 30.
9. Lykkesfeldt, J. and O. Svendsen, 2007. Oxidants and antioxidants in disease: Oxidative Stress in Farm.
10. Cerri, R.L.A. H.M. Rutigliano, F.S. Lima, D.B. Araujo and J.E.P. Santos, 2009. Effect of source of supplemental selenium on uterine health and embryo quality in high-producing dairy cows, Theriogenol. 71: 1127-1137.
11. Gupta, S. H.K. Gupta and J. Soni, 2005. Effect of vitamin E and selenium supplementation on concentrations of plasma cortisol and erythrocyte lipid peroxides and the incidence of retained fetal membranes in crossbred dairy cattle. Theriogenol. 64: 1273-1286.
12. Kankofer, M. 2002. Superoxide dismutase and glutathione peroxidase activities in bovine placenta : spectrophotometric and electrophoretic analysis, Vet. Revue Med. 153(2): 121-124.
13. Larry Smith, K. J.H. Harrison, D.D. Hancock, D.A. Todhunter and H.R.Conrad, 1984. Effect of vitamin E and selenium supplementation on incidence of clinical mastitis and duration of clinical symptoms, J. Dairy Sci. 67: 1293-1300.
14. Pavlata, L. J.Prasek, A. Podhorsky, A. Pechova and T. Haloun, 2003. Selenium metabolism in cattle: maternal transfer of selenium to newborn calves at different selenium concerations in dams, Acta Vet. Brno. 72: 639-646.
15. Pavlata, L. J. Prasek, J. Filipek and A. Pechova, 2004. Influence of parenteral administration of selenium and vitamin e during pregnancy on selected metabolic parameters and colostrum quality in dairy cows at parturition, Vet. Med. Czech, 49(5): 149-155.
16. Pavlata, L. L. Podhorsky, A. Pechova and R. Dvorak, 2005. Incidence of hypovitaminosis E in calves and therapeutic remedy by selenium vitamin supplementation, Acta Vet. Brno, 74: 209-216.
17. Harapin, I. M. Bauer. L. Bedrica and D. Potocnjak, 2000. Correlation between glutathione peroxidase activity and the quantity of selenium in thewhole blood of beef cattle. Acta Vet. Breno, 69: 87-92.