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The Effect of Using Monensin on Haptoglobin Serum Level in Dairy Cattle

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Abstract: The present study was conducted in order to examine the effect of monensin on serum level of haptoglubolin in pregnant dairy cattle. About 20 heads of pregnant dairy cattle (5 months pregnant) were selected in two, control and treatment, groups. The cattle of two groups were in the same situation considering management, production and age. In treatment group about 200 mg monensin was added to the diet of each cattle head in addition to the ordinary diet of control group. On days of 0, 30, 90, 120, time of parturition and 2 weeks after parturition the blood samples was collected from jugular vein and then serum was separated. In all serum samples the haptoglobin serum level was measured by biochemical kit. The average of serum haptoglobin did not have meaningful difference between two groups on day of zero but in care group there was decrease in serum haptoglobin after the day of 30 and on the day of 30 the difference between two groups was not significant ($p = 0.066$). On the day of 90 and 120 this difference was significant and it was $p = 0.037$ and $p = 0.04$, respectively. On parturition time, haptoglobin serum level increased in two groups and this increase in treatment group was less than control group which was nonsignificant ($p = 0.003$) and 2 weeks after parturition it was low in treatment group which was not significant ($p = 0.586$). The changes of serum haptoglobin in control group was not meaningful on different times but in treatment group the serum changes was significant on days of zero and 30 ($p = 0.04$). The mean serum level of this protein in affected cattle to parturition diseases was greater than healthy carrel in two groups. Final result was that adding monensin to pregnant cattle diet led to decrease of haptoglobin serum level, 4 month before parturition.

Key words: Cattle, haptoglobin, monensin, serum level, treatment, Iran

INTRODUCTION

Monensin is of ionophores and basically is the fermentation product of streptomycin synamonsis which produces during the growth of this fungus. This drug is the first anti coccydiosis which is produced and offered commercially. Monensin has the capacity of being complex with ions especially with sodium. Hence, lying in the membrane of microscopic existents like bacteria and protozoa, monensin makes influx able for passing potassium and sodium ions and by this way stops some of the mitochondrial activities such as oxidation (Conner *et al*., 1988; Radostits *et al*., 2007).

It has shown that monensin has a positive effect on the immune of dairy cattle also it increases neutrophiles function (Duffield *et al*., 2002; Stephenson *et al*., 1996).

Haptoglobin, on the other hand increases as an acute phase protein in most cattle diseases and its raise advantages to cattle. This protein rises in some disease such as mastitis, ketosis, endometritis and haptoglobin (Uchida *et al*., 1993a, b). Then the current study is considered as a criterion for evaluating the rate of stress and the effect of monensin on haptoglobin serum level was evaluated in dairy cattle for determining the rate of stress. In this study, the pregnant cattle was selected and monensin was added to their diet then on successive months and on the time of parturition, haptoglobin serum level was measured for determining the rising or falling level of haptoglobin in cattle with parturition disease.

MATERIALS AND METHODS

About 20 heads of pregnant cattle (5 months pregnant) was selected from a large dairy cattle pen. They are at same situation considering feed, management and age of pregnancy and were divided in two groups of 10 heads. The first group, control group, received ordinary diet until the time of parturition but the 2nd group received 200 mg monensin in addition to ordinary diet per each cattle daily. On days of 0, 30, 60, 120, 90 time of parturition and 2 weeks after parturition, blood samples of two groups were collected and haptoglobin serum level

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was measured using biochemical kit. Two group's mean level of serum haptoglobin was obtained at different times and was comprised using t-test.

The cattle of two groups were examined after parturition and each group was divided in two, patient (hard labor, remained placenta, metritis, mastitis, ketosis and dislocated abomasums) and healthy, groups and haptoglobin mean level was compared in these two groups. Obtained data were under 18 statistical analyses by PASW SPSS software.

RESULTS AND DISCUSSION

The mean level of Haptoglobin serum in treatment and control groups was 2.42±0.88 g L^{-1} and 2.30±0.87, respectively. There was no significant statistical difference between two groups (p = 0.922). At the time of 30, mean level of serum haptoglobin in treatment and control groups was 0.56±0.14 and 1.45±0.44 g L^{-1}, respectively that there was no significant difference between two groups (p = 0.66) (Table 1).

At the time of 90 and 120, mean level of serum haptoglobin in treatment group was 0.53±0.15 and 0.54±0.18 g L^{-1}, respectively that in comparison with control group at these times had reduction of 2.222±0.68 and 1.962±0.65 g L^{-1}, respectively so, the difference between 2 times was significant (p = 0.037 and p = 0.04, respectively). Mean level of haptoglobin serum of treatment and control groups at the time of parturition were 4.71±0.58 and 7.25±0.48 g L^{-1}, respectively in which there was significant difference (p = 0.003).

About 2 weeks after parturition, mean level of haptoglobin in the serum in treatment and control group was 3.35±0.958 and 4.28±1.38 g L^{-1}, respectively in which there was no significant difference between two means (p = 0.586).

Mean level of serum haptoglobin in control group from the time of zero until 2 weeks after parturition did not show any significant changes but in control group the changes of serum haptoglobin was significant from time of zero until 2 weeks after parturition (p = 0.04) (Fig. 1 and Table 2).

The mean level of serum haptoglobin in healthy and patient cattle of control group before and after parturition were 0.99±0.45 and 9.22±0.47 g L^{-1} and it was different significantly (p = 0.00).

The mean level of serum haptoglobin in healthy and patient cattle of treatment group before and after parturition were 1.57±0.25 and 7.51±0.91 g L^{-1} and it was different significantly (p = 0.017).

Haptoglobin is one of the acute phase proteins of inflammation which increases during disease. It has been

Table 1: The mean level of serum haptoglobin in control and treatment groups at different times of sampling

Time	Group	Numbers	Means±SE	SD	p-value
0	Treatment	10	2/42±0/88	2/79	
	Control	10	2/30±0/87	2/78	0/922
30	Treatment	10	0/56±0/14	0/45	
	Control	10	1/45±0/44	1/38	0/066
90	Treatment	10	0/53±0/15	0/46	
	Control	10	2/22±0/68	2/16	0/037
120	Treatment	10	0/54±0/18	0/56	
	Control	10	1/96±0/65	2/07	0/040
Parturition	Treatment	10	4/71±0/58	1/84	
time	Control	10	7/25±0/48	1/52	0/003
2 weeks of	Treatment	10	3/35±0/95	3/01	
parturition	Control	10	4/28±1/38	4/36	0/586

Table 2: Comparison of haptoglobin mean changes in control and treatment groups by increasing time

Time	Group	p-value
Day 0 and 30	Treatment	0/049
	Control	0/362
Day 30 and 90	Treatment	0/895
	Control	0/432
Day 90 and 120	Treatment	0/967
	Control	0/743
Day 120 and parturition time	Treatment	0/865
	Control	0/391
Parturition time and 2 weeks of parturition	Treatment	0/074
	Control	0/557

The mean level of serum haptoglobin in healthy and patient cattle of control group before and after parturition were 0.99±0.45 and 9.22±0.47 g L^{-1} and it was different significantly (p = 0.00)

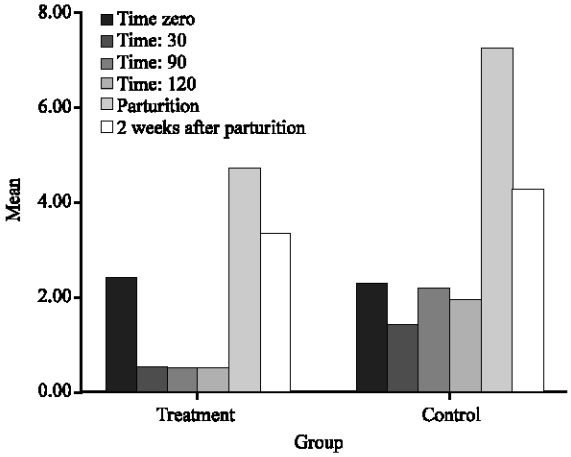

Fig. 1: General diagram of the mean level of serum haptoglobin in control and treatment groups at different times

shown in this study that serum mean between two groups at the time of zero was not meaningful (p = 0.922). Despite haptoglobin serum levels declining on day 30, no meaningful difference was observed (p = 0.66) but on days 90 and 120 this declining was meaningful (p = 0.037 and p = 0.04, respectively).

Monensin is one of inopheres which is a positive gram bacterium and can promote glucose production. With increasing the production of glucose, haptoglobin

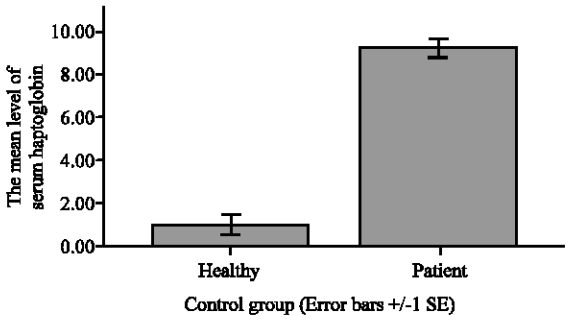

Fig. 2: The mean level of serum haptoglobin in healthy and patient cattle of control group before and after parturition

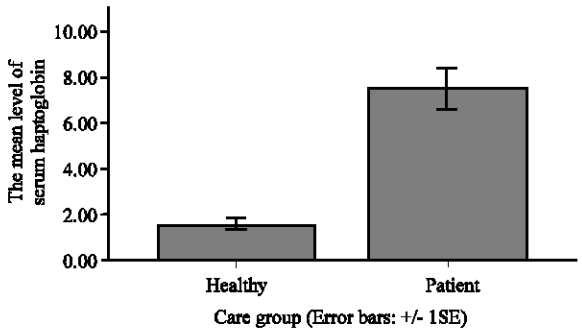

Fig. 3: The mean level of serum haptoglobin in healthy and patient cattle of treatment group before and after parturition

Table 3: Comparison of serum haptoglobin mean level in healthy and patient cattle of treatment and control groups before and after parturition

Groups	Sub group	Numbers	Means±SE	SD	p-value
Treatment	Healthy	7	1/57±0/25	0/67	0/017
	Patient	3	7/51±0/91	1/57	
Control	Healthy	6	0/99±0/45	1/11	0/000
	Patient	4	9/22±0/47	0/87	

production is reduced so the reduction of serum haptoglobin in care group can be related to this issue. As it has been shown, using monensin on short term causes no changes in serum haptoglobin but from 2-3 months later meaningful changes is appeared in serum level of haptoglobin which demands greater investigation and it is better to compare the glucose. The fatty acids as well are evaluated by haptoglobin. Using monensin in care group on day 30 caused the meaningful changes in serum haptoglobin so that there was meaningful reduction in haptoglobin serum level in comparison with day of zero ($p = 0.04$) but these changes were not meaningful in control group. In spite of haptoglobin serum level reduction in care group at different times of sampling until after the parturition, this reduction was not meaningful neither control nor care groups. The mean of serum haptoglobin in two groups on parturition day increased but it was low in care group in comparison with control group ($p = 0.003$) (Fig. 2 and 3; Table 3).

Parturition is an acquired event and increase in haptoglobin serum is natural at this time. Using monensin in care group led to reduction of haptoglobin serum and this effect was shown also at parturition time. Haptoglobin serum plays the immunosuppressive role so haptoglobin would not always advantageous for cattle at the time of parturition. Hence, the positive effect of monensin on haptoglobin adjusting is accountable at the time of parturition. About 2 weeks after parturition the mean of haptoglobin serum in care group was lower than control group, meaningfully ($p = 0.086$). Considering the inflammation reduction process caused by parturition, the mean of haptoglobin serum in two groups decreased after the parturition but it was high in comparison with the time of before parturition which was because of stress due to lactiferous, production, changes in diet and some disease because of parturition.

Examined cattle in two groups were divided in two, healthy and patient, groups after parturition. In care group, 3 heads of cattle were patient (one of them had remained placenta, the other one had the dilation of sectuma and another one had endometric). The mean of serum haptoglobin in patient cattle was higher than healthy cattle and there were meaningful difference between two groups ($p = 0.017$). Also, 4 heads of control group cattle were patient (two heads had remained placenta and one head had mastitis and also one head had digestive ketosis) in which the patient subgroup had higher serum haptoglobin than the health subgroup ($p = 0.00$). Diseases related to the parturition caused to increase of serum haptoglobin because of creating acute inflammation process in body. The mean of serum haptoglobin in patient subgroup of control and care groups were 9.22±0.047 and 7.51±0.91 g L^{-1}, respectively. It is determined that the mean level of this acute phase protein in care group was lower that control group but this was not a meaningful difference. How ever, considering the haptoglobin role as a no suppressive acid, low mean of its level in care group can be benefit for cattle and this issue needs more investigations.

Skinner and Roberts (1994) have stated the increase of serum haptoglobin as the reason of diseases like mastitis, metritis and remained placenta (Skinner *et al*., 1991) also they have stated the increase of serum haptoglobin as milk fever (Skinner and Roberts, 1994). In some studies, the serum haptoglobin has been used as a prognosis of diseases. Carter *et al*. (2002) have pointed out consuming vitamin E and its role in haptoglobin serum level in patients having respiratory problems (Carter *et al*., 2002).

Uchida *et al*. (1993a, b) characterized that steatosis syndrome causes to increase haptoglobin serum level (Uchida *et al*., 1993a, b). Duffield *et al*. (2002) showed in a case study on dairy cattle that using monensin has an effect on increasing of haptoglobin serum level and considered as a criteria for prognosis of a disease (Duffield *et al*., 2002).

CONCLUSION

Adding monensin in diet of pregnant dairy cattle some months before parturition causes some changes in haptoglobin serum level. Hence, monensin can play a protective role in cattle by reduction of haptoglobin serum level.

REFERENCES

Carter, J.N., G.L. Meredith, M. Montelongo, D.R. Gill, C.R. Krehbiel, M.E. Payton and A.W. Confer, 2002. Relationship of vitamin E supplementation and antimicrobial treatment with acute-phase responses in cattle affected by naturally acquired respiratory tract disease. Am. J. Vet. Res., 63: 1111-1117.

Conner, J.G., P.D. Eckersall, A. Wiseman, T.C. Aitchison and T.A. Douglas, 1988. Bovine acute phase response following turpentine injection. Res. Vet. Sci., 44: 82-88.

Duffield, T., R. Bagg, L. DesCoteaux, E. Bouchard and M. Brodeur *et al*., 2002. Prepartum monensin for the reduction of energy associated disease in postpartum dairy cows. J. Dairy Sci., 85: 397-405.

Radostits, O.M., C.C. Gay, D.C. Blood and K.W. Hinchcliff, 2007. Veterinary Medicine. 9th Edn., W.B. Saunders Company Ltd., London, pp: 563-565.

Skinner, J.G. and L. Roberts, 1994. Haptoglobin as an indicator of infection in sheep. Vet. Rec., 134: 33-34.

Skinner, J.G., R.A. Brown and L. Roberts, 1991. Bovine haptoglobin response in clinically defined field conditions. Vet. Rec., 128: 147-149.

Stephenson, K.A., I.J. Lean and T.J. O'Meara, 1996. The effect of monensin on the chemotactic function of bovine neutrophils. Aust. Vet. J., 74: 315-317.

Uchida, E., N. Katoh and K. Takahashi, 1993b. Appearance of haptoglobin in serum from cows at parturition. J. Vet. Med. Sci., 55: 893-894.

Uchida, E., N. Katoh and K. Takahashi, 1993a. Induction of haptoglobin by administration of ethionine to cows. J. Vet. Med. Sci., 55: 501-502.