

## Evaluation of Serum Sialic Acid in Cows with Theillieriosis

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**Abstract:** Theillieriosis is one of the common protozoan disease in cows that experimental figures of this disease has great help in diagnosis and treatment. This study aimed to evaluate serum concentrations of sialic acid (total sialic acid and lipid compound sialic acid and protein compound sialic acid) as markers of inflammation in infected cattle. In the large animal clinic of Islamic Azad University, Veterinary Faculty and some dairy cattle farm around Tabriz, 37 infected cows to Theillieriosis were determined based on clinical and experimental signs. They obtained blood samples from the jugular vein and serum was isolated. Total 35 cows were taken as control samples. Serum levels of these parameters were measured using Sydow and Katpodis method. Mean values of serum sialic acid, lipid compound sialic acid and proteins compound sialic acid in infected cattle to Theillieriosis were  $3.26 \pm 0.13$ ,  $1.10 \pm 0.070$ ,  $0.91 \pm 0.056$  mmol L<sup>-1</sup> and in healthy cows were  $1.96 \pm 0.12$ ,  $0.68 \pm 0.064$ ,  $0.74 \pm 0.061$  mmol L<sup>-1</sup>, respectively that differences between the two groups in all three cases was significant ( $p = 0.000$ ,  $p = 0.000$ ,  $p = 0.046$ , respectively). It was found that patients with elevated serum levels of total serum sialic acid, total amount of lipid compound sialic acid and proteins compound sialic acid are increased. But there was no significant correlation between them ( $r = 0.136$ ,  $0.064$ , respectively). The final result is that increase of sialic acid serum concentration in infected cows to Theillieriosis is mark of inflammation trend and measuring this parameter in experimental verifying of Theillieriosis disease can be useful.

**Key words:** Theillieriosis, cows, sialic acid, serum concentration, blood samples, Theillieriosis

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### INTRODUCTION

Theillieriosis is a common disease in this region that causes economical damage for farmer annually this disease changes biochemical and hematological logogram that these findings have been published in the previous research (Radostits *et al.*, 2007; Razmi *et al.*, 2003; Sayin *et al.*, 2002). Sialic Acid (SA), an acetylated derivative of neuroaminic acid is widely distributed in mammals tissue. N-acetyl Neuroaminic Acid (NANA) is the most common form of sialic acid. Since, SA is usually bound to glycoproteins, glycolipids, oligosaccharides and polyyasaccharides, small amount of it is free in the body. Moreover, SA is an important structural component of biological membrane. It was also widely found in bacteria and animal tissues sialic acid concentration increases rapidly following the inflammatory and injury process. The mechanism inducing SA increase is not clearly understood. However, investigators have reported that SA localized at the end chain of many acute phase proteins can be used as marker for the determination acute phase protein concentrations because serum acute phase

proteins, especially  $\alpha 1$  acid glycoprotein are sialyated glycoproteins. Therefore, the detection of SA particularly LBSA levels may be a valuable indicator for diagnosis and prognosis of inflammatory diseases (Karapehlivan *et al.*, 2007; Ekin *et al.*, 2003).

Purpose of this research was a comparison of sialic acid in normal cows with infectious groups. That this research showed this factor was in of position inflammatory proteins and also was determined total acid level, sialic acid binding lipid and protein level in the serum.

### MATERIALS AND METHODS

Researchers recognized 37 head of infected cows by theillieriosis in large animal clinic, Faculty of Veterinary, Islamic Azad University, Tabriz Branch and some dairy farms in the surrounding of the Tabriz. We recognize this disease based on clinical sings and laboratory approval (sampling of ear vein and lymph nodes). We gathered 10 cc blood sample from jugular vein by vein by venoject tube. Blood sample sent to laboratory other coagulation

and then was freeze after blood free serum by centrifuge. Contemporary, we gathered sample from 35 head of normal cows in place of control group. From serum samples, total sialic acid, sialic acid binding protein and lipid was measured by Sydow (1985) and Katopodis method.

**Statistical analyze:** SPSS statistical software (18 edition) and t-test statistical methods was used for average contrast between control groups and infected groups and also correlation was used between parameters.

## RESULTS AND DISCUSSION

Mean level of sialic acid in control group and infected group was  $1.96 \pm 0.12$  and  $3.26 \pm 0.13$  mmol L<sup>-1</sup> in serum regularly. Results showed a significant difference between two groups ( $p = 0.000$ ). Statistical analyze signed significant correlation about sialic acid binding lipid between two groups was  $1.1 \pm 0.070$  and  $0.68 \pm 0.064$  mmol L<sup>-1</sup> ( $p = 0.000$ ) and also sialic acid binding protein level of serum in infected group was more than of the controlled group that this findings impress significant difference ( $0.91 \pm 0.056$  and  $0.74 \pm 0.061$  mmol L<sup>-1</sup>) ( $p = 0.046$ ) (Fig. 1-3). According to the results, it is not found significant relationship between

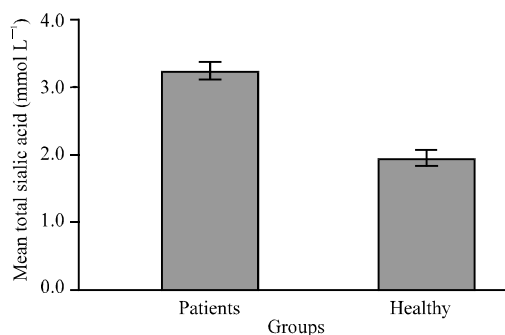


Fig. 1: Mean serum total sialic acid in patients and healthy cows (Error bars:  $\pm 1$  SE)

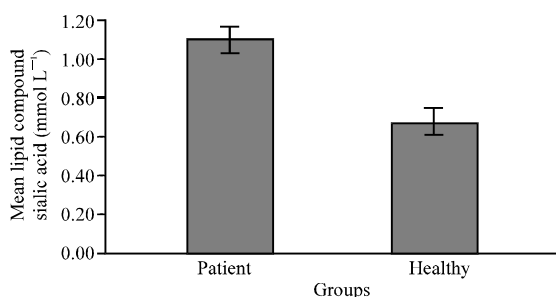


Fig. 2: Mean serum lipid compound sialic acid in patients group and healthy (Error bars:  $\pm 1$  SE)

total level of sialic acid in the serum with sialic acid binding lipid level in the serum and also this findings acquired from correlation between sialic acid totoal level with cialic acid binding protein level in serum (Table 1 and 2).

Measure of this acid level in serum is important to diagnosis and to prevent of inflammatory and cancer disease. Serum level of sialic acid has changed in variable disease for example; nephritic syndrome arthritic romatoid (Schauer, 1982; Steffelli *et al.*, 1985) chronic tuberculosis (Carter and Martin, 1962) infectious menangit (Harma and Sur, 1967) trypanosoma (Esievo *et al.*, 1982). Bovine enzootic hemathuria (Singh *et al.*, 1980) distemper (Engen, 1971) anaplasmosis and leptospirosis in bovine. Theillieriosis is a common disease in this region that causes different effect in serum level consistency. Based on the results, Theillieriosis has a inflammatory process. Increase in serum level this acid showed inflammatory process in this study, salic acid total consistency (acid attached to lipid and protein) is considered to determine inflammatory process. In this study, it is determined, total acid in infected cows if more than of normal cows in serum. The results of this study is compatible with other researchers (Abramjan, 1968). Based on the results, it is

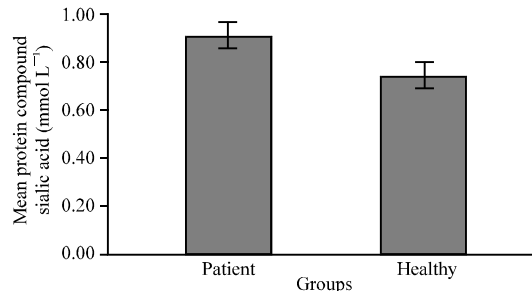


Fig. 3: Mean serum protein compound sialic acid in patients and healthy (Error bars:  $\pm 1$  SE)

Table 1: Comparison of mean serum levels of total sialic acid, lipid compound sialic acid and protein compound sialic in patient groups and healthy

Parameters	Groups	Number	Mean $\pm$ SD	p-values
Total sialic acid (mmol L <sup>-1</sup> )	Patient	37	3.25 $\pm$ 0.130	0.000
	Healthy	35	1.96 $\pm$ 0.120	
Lipid compound sialic acid (mmol L <sup>-1</sup> )	Patient	37	1.10 $\pm$ 0.700	0.000
	Healthy	35	0.68 $\pm$ 0.064	
Protein compound sialic acid (mmol L <sup>-1</sup> )	Patient	37	0.91 $\pm$ 0.056	0.046
	Healthy	35	0.74 $\pm$ 0.061	

Table 2: The correlation of total sialic acid with lipid compound sialic acid and protein compound sialic acid in patient group

The correlation of		
total sialic acid with	Pearson correlation (r)	p-values
Lipid compound sialic acid	0.136	0.423
Protein compound sialic acid	0.064	0.708

considered that tissue damage causes sialic acid increase in serum that this process elevate release of globulins in the first of inflammatory reaction and injury process, increase acid consistency rapidly but the method of this elevation is unknown ( $p = 0.000$ ). Also, concentration of the acid in serum lipids and associated proteins in cattle sialic transplant patients found no significant difference with healthy cows (respectively,  $p = 0.000$  and  $p = 0.046$ ). Increase of sialic acid attached to protein relate the elevation of inflammatory acute phase (Haq *et al.*, 1993; Stefanelli *et al.*, 1985). It is possible relationship between WBC cell reaction with increase in sialic acid level. On the other hand, the damage tissue release sialic acid from cell membranes because sialic acid exist in all cell membranes abundantly. Based on the study by Citil *et al.* (2004) in cows with TRP, sialic acid level total and sialic acid attached to protein and lipid in serum were 1.163, 0.615 and 0.548 g L<sup>-1</sup>.

Also in study of infected cows with subclinical and clinical mastitis. By Nazifi *et al.* (2008) amount of these levels were (3.20, 1.64 and 1.63 mmol L<sup>-1</sup>) more than of normal cows. The result found increase in total sialic acid elevate sialic acid binding to lipid and protein. Level in serum but it is not found significant correlation between amount of total sialic acid level with this acid binding to lipid and protein, in infected cows by theileriosis ( $r = 0.064$ , 0.136).

## CONCLUSION

In this study, these results showed increase in sialic acid level in serum is a good prognosis for inflammatory process in this disease.

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