

Identify relationship among these acute-phase proteins (Hp and Fb), albumin and clinical finding in dairy calf pneumonia

G.R. ; Mohammadi ¹, M.; Mohri ¹, A. Fathi ²

¹ Department of clinical sciences, School of Veterinary Medicine, Ferdowsi University of Mashhad, P .O. Box: 91775-1793, Mashhad-IRAN. gmohamad@ferdowsi.um.ac.ir

² Graduated from School of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad-Iran

Summary

This study was performed to examine the acute phase response in calves during dairy calf pneumonia. We measured acute phase proteins (App) and identified some potential markers useful for evaluation of calves' health status.

Sixty Holstein calves were selected in this study. After clinical examination, clinical findings were recorded from physical examination of individual. Two blood samples were taken from the calves. One of the sample had EDTA anti coagulant. Blood samples were used for CBC and serum biochemical analysis.

The results of this study showed a significant increase in Hp and fibrinogen. Our results indicated the application of Haptoglobin and fibrinogen measurements as indicators of health in calf herds, thereby facilitating treatment decisions.

1. Introduction

Dairy calf pneumonia (Enzootic calf bronchopneumonia) is a multifactor disease that occurs in association whit the interaction of various infectious agents ,and calf susceptibility(Lillie 1974, Radostits et al 2000) .The economic losses is associated with death loss and treatment costs, reduction of live weight gain and reduced of productive life span, which May be considerable.

The Strategies of the control dairy calf pneumonia (DCP) through management practices, vaccination and treatment. Treatment is an integral part of any control program of respiratory disease in calves.

The aim of treatment is eradicating the pathogen and lowering the volume of inflammation and adverse effects of pyrexia and depression.

Treatment must be instigated as early as possible to reduce the possibility of long term pulmonary damage and the development of chronic pneumonia.

The APR is a non-specific reaction of the body to various forms of tissue damage. The response is a part of the innate, non-specific immune defense and is essentially the same regardless of the type of disturbance to the body. The APR consists of several reactions including behavioral, hematological, metabolic, biochemical and immunological changes, and

is initiated at the site of the tissue damage. Macrophages are the cell type that recognize products from micro-organisms, and thereby become stimulated to release pro-inflammatory cytokines, like interleukin (IL)-1, IL-6 and tumor necrosis factor- α (TNF- α). Virus infected cells produce interferon's (e.g. IFN- α) that act as antiviral cytokines in order to protect other cells against infection and stimulate the immunological response. The production of cytokines stimulates cells to produce more cytokines and other inflammatory mediators, which circulate in blood. The pro-inflammatory cytokines activate different target cells and stimulate the hepatocytes to alter their production of proteins. The proteins with altered production are called APP and can be divided into positive and negative.

The objective of this study was to examine the acute phase response, as measured mainly by acute phase proteins (APP) and cellular response, in calves during enzootic bronchopneumonia and to identify potential markers useful in evaluation of their health status.

2. Materials and methods

2.1. Animals and blood collection

Thirty Holstein calves from two weeks up to six-month-old in dairy farms of Mashhad Suburb with suspected to dairy calf pneumonia were enrolled in the study. A case calf one in which pneumonia was diagnosed by the clinician. Clinician diagnosed respiratory tract disease was defined as detection of abnormal clinical signs related to the respiratory tract, such as abnormal sounds on auscultation of the respiratory tract, high rectal temperature (>39.5 °C), signs of depression, and lack of involvement of other body systems that might explain the fever (Mohammadi et al 2004).

Calves were excluded from the study if there were clinical evidence of concurrent diseases.

Blood samples were collected via jugular vein puncture after clinical examination and analyzed for haematological indices, serum total protein, serum globulin, albumin concentration and plasma fibrinogen and Haptoglobin concentration. Healthy calves (n=30) and their results were taken as control values.

2.2. Analyses and measurement methods

Two blood samples were taken from jugular vein with and without EDTA for measuring hematology indices and serum total protein, albumin and serum Haptoglobin. Total protein concentrations (g/L) were determined using a standard biuret method (Merckotest Manufacture for the determination of quantitative electrophoretic fractions). Fb was determined the day of sampling on centrifuged EDTA plasma, and serum Hp by means of quantitative

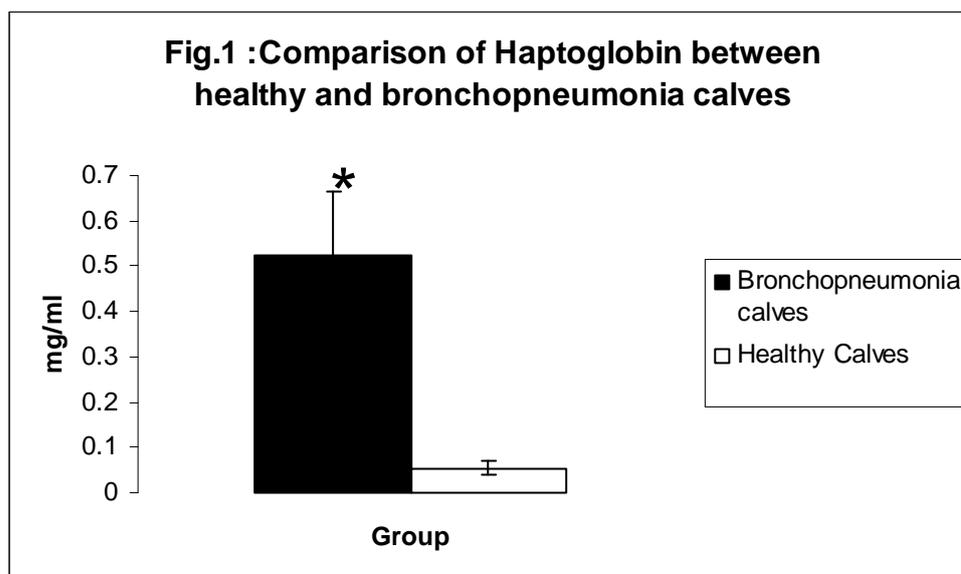
measurement of Haptoglobin kit (Tridelta Development Limited) .Hp concentration was expressed as (mg/ml). Albumin concentrations (g/dl) were determined using (BCG) method.

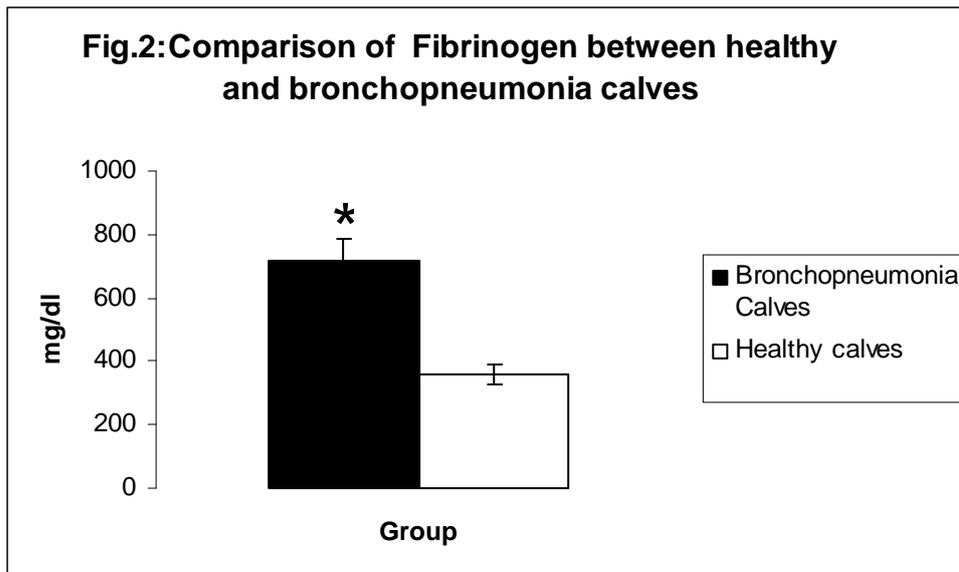
3.3. Statistical analyses

The results were analyzed with statistical package spss13, using Independent -Sample T test. $P < 0.05$ was considered as significant. The difference presented between diseased calves and healthy calves.

3. Results

The results of measurements are shown in figures 1,2. There were no significant differences between groups for hematology indices, total protein, serum albumin and globulin concentrations, but there were significant difference between healthy group and DCP group for vital signs records and Hp and Fb concentrations.





4. Discussion

The comparison of different serum proteins in calves suffering from dairy calf pneumonia demonstrated that Hp and Fb could detect truly healthy calves among DCP calves. Hp and Fb effectively identified the diseased calves more easily because Hp and Fb values in healthy calves were very low, compared to those recorded during the inflammatory process. Hp and Fb values in diseased calves were significantly different from the values recorded among healthy calves. Blood sampling may have been performed at different times of the disease process, or may be a difference does exist between individuals with relation to the inflammatory response. Early serum determination of Hp and Fb in growing calves suffering from dairy calf pneumonia allowed the identification of calves that required antibiotic and ant inflammatory drugs. The observation of Young et al (1996), Hp and Fb could be used in feedlot calves suffering from bronchopneumonia to select those animals that needed antibiotics ant AI drugs. Hp or Fb alone was helpful to confirm a healthy status. It is concluded That Hp and Fb concentration are a useful indicator for surveying dairy calf pneumonia in calves. The usefulness of serum Hp and plasma Fb concentration can then be evaluated for the early detection of dairy calf pneumonia.

References

Lillie, L.E. (1974).The bovine respiratory disease complex .*Canadian Veterinary Journal* 15: 233-242.

Mohammadi, Gh. R., Sharifi, K., and Sepahi; S. (2004). Comparison of the therapeutic

effect of florfenicol and tilmicosin in enzootic calf bronchopneumonia. *JOURNAL OF THE FACULTY OF VETERINARY MEDICINE UNIVERSITY OF TEHRAN* 59: 277-282.

Radostits, O.M., Gay, C.C., Blood, D.C., and Hinchcliff, K.W. (2000) Shipping fever and enzootic pneumonia In Radostits, O.M., Gay, C.C., Blood, D.C., Hinchcliff, K.W.(Ed.).Pp:839-852; 1160-1168. *Veterinary Medicine. A textbook of disease of cattle, sheep, pigs, goats and horses.* (9th edn.). Philadelphia: WB Saunders Co USA.

Young,C.R.,Wittum,T.E.,Stanker,L.H.,Perino,L.j., Griffin,D.d.,Littledike,E.T.,(1996) Serum Haptoglobin concentrations in a population of feedlot cattle. *American journal of Veterinary Research*57,131-141.