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Comparison of Fibrinogen in The Phases Before, During, and After Therapy in Cattle Suspected of Foot and Mouth Disease (FMD)

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Abstract

The purpose of this study was to compare fibrinogen levels between the phase before therapy, the stage when treatment, and the recovery phase in cattle with suspected Foot and Mouth Disease (FMD). This study used six cows suspected of having PMK with clinical symptoms of hypersalivation, anorexia, and sores on the mouth and legs in Sleman Regency, Special Region of Yogyakarta. All cows suspected of FMD were given antibiotics, antihistamines, antipyretics, and vitamins for three consecutive days. Blood sampling was carried out in three phases: pre-therapy, during therapy, and the phase after treatment. The pre-therapy phase occurs when clinical symptoms first appear before therapy is given. The therapy phase was carried out on the 4th day after the first clinical symptoms appeared. The stage after therapy is carried out when the cow recovers from clinical signs. Blood samples were taken from the jugular vein as much as 6 ml and put into a Vacutainer tube with Ethylene Diamine Tetraacetic Acid (EDTA) anticoagulant to analyze fibrinogen levels then. The average fibrinogen value in the pre-drug administration phase was 380 ± 130.38 mg/dL, the therapy phase was 633.33 ± 136.63 mg/dL, and the recovery phase was 566.67 ± 136.63 mg/dL. The conclusion showed that the highest fibrinogen levels were found in the therapy phase compared to the pre-therapy and recovery phases.

Keywords : Blood plasma; Infection; Inflammation, hypersalivation

Introduction

Foot and mouth disease (FMD), also called foot mouth disease (FMD) is a vesicular viral disease with high transmission in cloven-hoofed animals such as cows, goats, buffalo, sheep, and pigs. FMD virus belongs to the Aphthovirus genus of the Picornaviridae family (Hashem *et al.,* 2018). FMD disease is generally characterized by increased body temperature, breathing, and pulse and the formation of vesicles on the epithelium of the tongue and skin, especially in the interdigital epithelium of the feet (Faruk et al, 2021). In particular, cows are more susceptible (than what kind of animal) and show prominent vesicular lesions inside the mouth and legs. Transmission of FMD virus can occur through the respiratory, oral, or percutaneous route (Zhang *et al.,* 2022). Cows are one of the sizeable ruminant livestock and cloven-hoofed animals susceptible to FMD. Since April 2022, sector cattle farms in Indonesia have been facing severe problems due to the transmission of FMD, significantly affecting a region's economy and even countries (Rohma & Zamzami, 2022). FMD can cause a downturn in body weight, decreased milk production, and cattle reproductive failure, significantly impacting economic losses (Faruk *et al.,* 2021). Fibrinogen is a blood plasma protein with a molecular weight of 340 kDa synthesized by the liver. The amount of fibrinogen in the plasma increases with tissue inflammation caused

by trauma, bacteria, viruses, and chemicals (McSherry & Horney, 1970). FMD virus attacks the epithelial cells of the nasopharynx animals. The virus enters the blood and multiplies itself in lymph glands and epithelial cells in the mouth and soles of the feet, causing inflammation as a defense mechanism for the body against viruses (Li *et al.,* 2021). The inflammation increased the number of fibrinogen in plasma; according to Duncan et al. (1994), fibrinogen constitutes an acute phase protein whose concentration increases during inflammation.

Foot and mouth disease (FMD) has an economic impact on countries that trade meat and products meat, so further research is needed on better methods to detect and control this disease. The inflammatory response in cattle infected with FMD can be described in the dynamics of fibrinogen due to fibrinogen being a suitable parameter in cases of inflammation. Fibrinogen levels will increase significantly in inflammatory conditions and decrease again when inflammation improves (Salasia & Hariono, 2016). It encourages research on the severity of FMD cattle on the dynamics of fibrinogen to find out information on the severity of FMD infection seen through clinical symptoms, especially inflammation of the mouth and nails. Many researchers haven't examined the relationship of fibrinogen dynamics to the pre-therapy phase, the phase of therapy administration, and the phase after administration of therapy in PMK cattle, so This research needs to be done to see the comparison of fibrinogen levels between the phase before being given medicine, phase when being given treatment, and phase after being given therapy in cattle suspected of FMD.

Materials and Methods

This study used six cows suspected of having FMD (with lesions on the mouth and feet/hypersalivation, etc.) with details of two female limousine cows 2-3 years old, one male limousine aged seven months, one male simental and one female simmental aged 1.5-2 years, and one male ongole (PO) breed eight years old. Sample later. Samples of treatment animals between the pre-treatment, treatment, and recovery phases are the same. The study was conducted from August to October 2022 in Sleman Regency, Yogyakarta Special Region. The area corresponds to the appearance of clinical symptoms of FMD cows.

Blood samples were collected from the jugular vein using a sterile syringe of 10 ml (One Med, PT One Med Health Care, Surabaya) with a needle size of 18 gauge and placed in a clean Vacutainer tube (Becton Dickinson and Company, USA) EDTA (Ethylene Diamine Tetra-acetic Acid) for examination fibrinogen. Blood sampling was carried out in three phases: the previous administration of therapy, during administration of treatment, and the phase after administration of therapy. Phase before therapy. The pre-therapy phase is carried out when the first clinical symptoms appear before treatment. The therapy phase was carried out on the 4th day after the first clinical symptoms appeared. The therapies provided include: vitamin B12 and a mixture of brown sugar water (Java), antibiotics, antihistamines, antipyretics, citric acid, and povidone iodine. The phase after the therapy administration is carried out when he recovered from the clinical symptoms of FMD. The data from the fibrinogen analysis is entered in the Microsoft Office Excel application then analyzed using the IBM SPSS Statistics version 25 application. Statistical analysis is performed using one-way analysis of variance (ANOVA). The result is expressed as mean ± standard error (S.E). The group differences are considered significant at $p<0.01$ and $p<0.05$.

Results and Discussion

The basic diagnosis of suspected PMK is established by the presence of clinical symptoms in the form of anorexia, increased body temperature, and hypersalivation, as shown in Fig 4, as well as a very high spread in a herd with a level of morbidity according to Sudarsono (2022) is almost 100%. Clinical symptoms of inflammation of the oral epithelium and nails are still not present at the initial diagnosis suspected and appeared on the 4th day after the first clinical symptoms appeared. The appearance of clinical signs of injury to the epithelium of the mouth and nails, according to Mahy (2005), occurred on days 4-5 after the first viral infection. According to Rohm et al. (2022), clinical symptoms of

PMK are increased body temperature, anorexia, hypersalivation, and injury to the epithelium of the mouth and nails. Other diseases similar to the clinical signs of FMD are Vesicular Exanthema, Vesicular Stomatitis, Rinderpest, and Mucosal Disease (Mahy, 2005).

The average levels of fibrinogen in cattle suspected of FMD are presented in table 1. The average result of the pre-therapy phase was 380 mg/dL; during the therapy phase, it was 633.33 mg/dL, and in the phase after being given therapy 566.67 mg/dL. Fibrinogen average yield is still within the normal range according to Salasia & Hariono (2016) and Ali et al. (2018); namely, normal fibrinogen in cattle is 300-700 mg/dL. Statistical analysis showed a significant increase between the pre-therapy phase with the therapy phase and the post-therapy phase ($P < 0.05$). In contrast, there was no significant difference between the therapy phase and the phase after being given therapy ($P > 0.05$).

Table 1. Average fibrinogen in FMD cows

FMD Phase	N	Fibrinogen Mean
Before treatment phase	5	380±130,38[a]
Treatment phase	6	633,33±136,63[b]
Recovery phase	6	566,67±136,63[b]

a,b Different superscripts in the same table indicate significant differences ($P<0.05$).

Low fibrinogen was found in the pre-therapy phase because cows have not shown symptoms of inflammation in the feet and mouth. Fibrinogen has increased in the therapy phase because the cow has Clinical signs that appear in the form of lesions and inflammation in the vesicular area of the mouth and leg traces, as shown in Figure 4. According to Salasia & Hariono (2016), Fibrinogen is an acute-phase protein whose levels will increase during inflammation. Clinical signs of inflammation in the mouth and feet occur on the 4th day after the appearance of the first clinical symptoms. Appearance of symptoms This clinical trial follows the report of Mahy (2005). Fibrinogen decreased, which was not significant in the post-therapy phase because the degree of inflammation in the mouth and nails began to decline, marked by drying lesions. The decrease in the level of inflammation is influenced by the administration of antibiotic therapy, anti-inflammatory, and antipyretic, which aims to reduce clinical symptoms and provide supportive treatment to improve the immune system, according to Wulandani (2022). The supportive therapy given is B-complex vitamins and brown sugar water. According to Megawati et al. (2021) B-complex vitamins help the immune system work optimally in neutralizing viruses and play a role in low fibrinogen metabolism found in the pre-therapy phase because cows have not shown symptoms of inflammation in the feet and mouth. Fibrinogen has increased in the therapy phase because the cow has Clinical signs that appear in the form of lesions and inflammation in the vesicular area of the mouth and leg traces, as shown in Figure 4. According to Salasia & Hariono (2016), Fibrinogen is an acute-phase protein whose levels will increase during inflammation. Clinical signs of inflammation in the mouth and feet occur on the 4th day after the appearance of the first clinical symptoms. Appearance of symptoms This clinical trial follows the report of Mahy (2005). Fibrinogen decreased, which was not significant in the post-therapy phase because the degree of inflammation in the mouth and nails began to decline, marked by drying lesions. The decrease in the level of inflammation is influenced by the administration of antibiotic therapy, anti-inflammatory, and antipyretic, which aims to reduce clinical symptoms and supportive treatment to improve the immune system, according to Wulandani (2022). The supportive treatment given is B-complex vitamins and brown sugar water. According to Megawati *et al.,* (2021) B-complex vitamins help the immune system work optimally in neutralizing viruses and plays a role in energy, protein and fat metabolism to maintain a healthy

Figure 4. Hypersalivation (A), Randomized interlocutory lesion (B)

body. Water Brown sugar can reduce stress and improve livestock performance because sugar red contains 66.187% sucrose, which is the part of carbohydrates and is a function main energy producer (Joris & Fredriksz, 2019).

Conclusion

This study concludes that the highest fibrinogen levels were found in the phase of therapy compared to the stage before administration therapy and the post-therapy phase.

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