Clinical Investigation of Anaplasmosis in Goat at UVH in Kashiani Upazilla, Gopalganj

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TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

Anaplasmosis refers to a disease of ruminants caused by obligate intraerythrocytic organism *Anaplasma* sp. In this study blood samples were collected from 38 clinically sick goats with the history of anorexia, high body temperature, lethargy and diarrhoea that were brought to the UVH at Kashiani Upazilla in Gopalganj district between April 16, 2023 to June 08, 2023 for treatment purposes. After admission at UVH, initially all the goats were clinically examined for fever, respiratory and digestive tract disorders like, pneumonia, diarrhoea and bloat. In addition, superficial lymph nodes and external parasites were also examined. After careful clinical examinations high body temperature (above 103°F), anemia and dyspnea were recorded in all cases. Diarrhoea also observed in 8 goats with occulonasal discharges. Enlargement of suprascapular and prefemoral lymphnodes, and ectoparasite (Tick) was found in 12 cases. After the clinical examination procedures, a drop of blood was drained from the ear vein from all goats and blood smear was prepared and fixed with methanol. The purpose of the study was to determine the current state of *Anaplasma* sp. at UVH. After five minutes of methanol fixation, Giemsa stain was applied to the slides. As there was no facility for microscopic examination at the UVH, all the slides were carried to the Department of Pathology and Parasitology (DPP), CVASU after completing clinical placement. All the slides were examined carefully for the existence of blood protozoa in red blood cells using a microscope at a high magnification (10×100x) at DPP, CVASU. After microscopic examinations three of those samples were found positive (7.89%) for *Anaplasma marginale*. However, after clinical examinations and based on tentative diagnosis all the goats were treated with Oxytetracycline at 22 mg per kg body weight, Imidocarb dipropionate at 5 mg per kg body weight, Pheniramine maleate at o.5 mg per kg body weight and vitamin B-complex for 7 days and followed up for recovery stage. All the three goats that found positive for *Anaplasma* in microscopic examinations also considered for the same treatment and recovered from clinical symptoms which indicated that Oxytetracycline and Imidocarb medication was found to be effective against *Anaplasma* sp. in goat.

Keywords: Anaplasmosis, oxytetracycline, imidocarb dipropionate, percentage, UVH, goat

CHAPTER I
INTRODUCTION

Bangladesh is one of the world's developing agro-based nations. One of the most significant agricultural sectors that supports both the national economy and public health is livestock. The majority of livestock are ruminants, particularly large ruminants like cattle and buffaloes and small ruminants like sheep and goats. There are 26.9 million goats in Bangladesh, and they produce 130,000 tons of goat meat, 1.31 million tons of goat milk, and 42,000 tons of fresh skin per year (DLS, 2023). The weather in Bangladesh is quite conducive to a number of animal diseases. Blood parasite disorders are significant illnesses that have an impact on livestock output. The most prevalent of them are Theileriosis, Anaplasmosis, and Babesiosis.

Goats can contract an infectious, hemolytic, noncontagious disease called anaplasmosis, which is brought on by the protozoan *Anaplasma marginale* and *Anaplasma centrale*. Ticks are the disease's primary carrier. In addition to ticks, the disease is also spread by mosquitoes, *Tabanas* species, and *Stomoxys* species. Mechanical transmission through dehorning, castration, vaccination, ear marking has been suggested (Soulsby, 1986). Transplacental transmission has also been observed (Trueman and Melennan, 1987).

It is widely distributed in tropical and sub-tropical countries. Seroprevalence of the disease has been reported from various states in the sub-continent by different workers (Levine, 1985; Radostits et al, 1994; Gautam and Roy, 1972; Banerjee et al., 1977; Crown, 1990). Anaplasmosis is an infectious but not contagious disease. The organism that causes anaplasmosis can be found in a wide variety of tick species. *Anaplasma centrale* and *Anaplasma marginale* are the two main bacterial pathogens. These bacteria infect red blood cells and are gram-negative. The immune system will attempt to eliminate the contaminated red blood cells as soon as the patient contracts anaplasmosis, but it will also destroy healthy red blood cells in the process (Hashemi, 1997).

A form of *Anaplasma* that has infected an animal multiplies in the bloodstream and clings to red blood cells. In the process of trying to destroy the contaminated blood cells, the immune system will also destroy healthy red blood cells (Fathivand, 1998). Anaemia and a host's manifestation of numerous other symptoms arise when the quantity of red blood cells being destroyed exceeds the quantity of new red blood cells being produced (Ferrer et al., 1998). Goat that has contracted anaplasmosis will always be carriers of the infectious disease, and any

kids born from carriers will also carry the disease. *Anaplasma marginale* is a multi-strain parasite that varies in appearance, antigenicity, protein sequence, and tick-transmission capacity. *Anaplasma marginale* infection has been discovered to be significantly influenced by major surface proteins (MSP).

Microscopically examining Giemsa-stained blood smears and, in acute instances, observing clinical signs are the main methods used to diagnose small ruminant anaplasmosis. However, following acute infections, healed animals often experience subclinical infections, which are imperceptible at the microscopic level (Devos and Potgieter, 1983). They might be seen as an infection source for the possible disease vector that spreads naturally.

This study set out to ascertain the infection percentage at UVH at Kashiani Upazilla in the Gopalganj district and to correlate that frequency with the age and sex of the afflicted animal.

CHAPTER II
MATERIALS AND METHODS

Study area and study period:

The study was conducted at Kashiani Upazilla Veterinary Hospital in the Gopalganj district from April 16, 2003, to June 8, 2023, on clinically suspected goats (febrile, anorectic, nervous manifestation, not responding to antimicrobial medication).

Animal and sample:

The presence of blood parasites was investigated in 38 suspected goats. Smears of peripheral blood were made from a goat that appeared to be anorectic and febrile. To identify blood parasites, methanol was used to fix smears, Giemsa stain was applied, and the samples were viewed via an oil immersion lens as per Soulsby's (1986) instructions.

Figure 1: Clinical examination of affected goat at UVH, Kashiani Upazilla, Gopalganj

Collection of blood:

Blood sample was obtained from the ear vein. Typically, a dorsal side marginal ear vein is used. Shaving or clipping was used to get rid of the hair. Apply alcohol to the skin. At the moment of applying the syringe, place the left index finger under the ear. This offers stability and guarantees that a cut is made solely through the skin and into the vein, not through the underlying cartilage, preventing notched ears and bloody fingers.

Preparation of blood smears:

a) Use brand-new, grease-free, tiny slides, ideally with edges that are level. The fresh slide needs to be dipped in 95% alcohol and dried with a clean cloth to prevent the erythrocytes from producing artefacts.
b) Smears should ideally be generated from freshly taken blood without the addition of an anticoagulant, since anticoagulants have a tendency to deform the cells.
    i) Hold the second slide (spreader slide) at a comfortable angle of around thirty degrees and place its end against the first slide's surface.
    ii) Once the blood has spread across at least two-thirds of the breadth due to capillary activity, gently draw the spreader slide into the drop of blood. The blood will then follow, forming a thin film, as we press the spreader slide forward steadily and evenly.

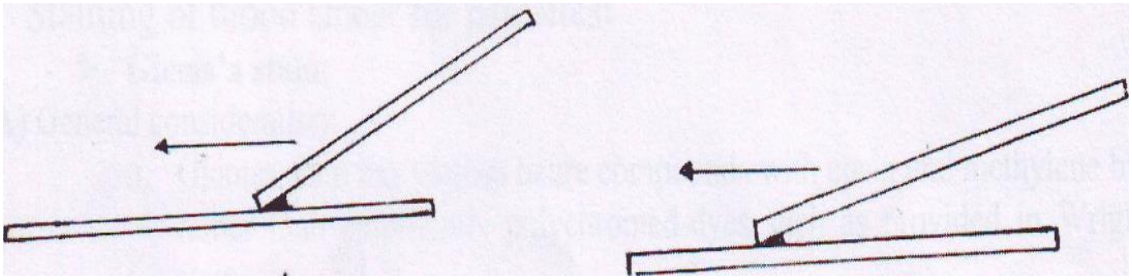

Figure 2: Slide Method of blood smear

Figure 3: Preparation of blood smear at UVH, Kashiani Upazilla, Gopalganj

The ideal film thickness is achieved when the film is thinner from the beginning to the tail or feather edge, as this prevents the cells in the thin area from being deformed.

The spreader's angle, the size of the drop, and the speed at which the spreader slide is pushed will all affect how thick the smear is. When blood spreads behind the spreader slide, a huge drop of blood may be left behind if the slide is lifted and moved forward before the blood spreads.

Fixation:

Slide was then fixed using 100% methanol for 10 minutes and then kept in a dry box for further staining

Staining of Blood Smear:

➢**Giemsa Stain:**

1) To fix the dried blood smear, place it in a Coplin jar filled with absolute methyl alcohol and let it sit for about three minutes.
2) After the alcohol has been drained, let the slide dry.
3) Slides should be staining for 15 to 30 minutes after being transferred to a second Coplin jar filled with fresh stain.

Microscopic examination: Examining a blood smear is a more accurate diagnostic technique.

Figure 4: Microscopic examination of *Anaplasma* organism in DPP Lab, CVASU

Treatment:

Specific etiologic treatment:

➢Tetracycline group of drugs (Oxytetracycline, tetracycline) are effective @ 20 -22 mg/kg b.wt. i/m

or

➢Imidocarb dipropionate @ 5 mg/kg b.wt. i/m is effective

or

➢Diminazine aceturate @ 3.5 mg /kg b.wt. deep i/m single dose

Symptomatic treatment:

- Antihistaminic – to prevent coughing, sneezing, nasal discharge etc.

Pheniramine maleate – H1 receptor blocker > the mast cell degranulation > cannot be occurred > action of Histamine is inhibited. @ 0.5-1 mg/kg b.wt. i/m or i/v

- NSAID – treatment of pain, pyrexia and inflammation. Inhibiting prostaglandin synthesis.

Meloxicam 0.2-0.3 mg/kg b.wt. s/c or i/v or i/m

- Vitamin B Complex – acts as co-factor for different enzyme to increase metabolism. Role of enzymatic co-factor in the metabolism of carbohydrate, protein and lipid.

- Fluid and electrolyte therapy – maintain the right balance of fluid and electrolyte.

CHAPTER III

RESULTS

A total of thirty-eight goats were investigated and three samples were found positive for *Anaplasma marginale* under the light microscope (Figure 5).

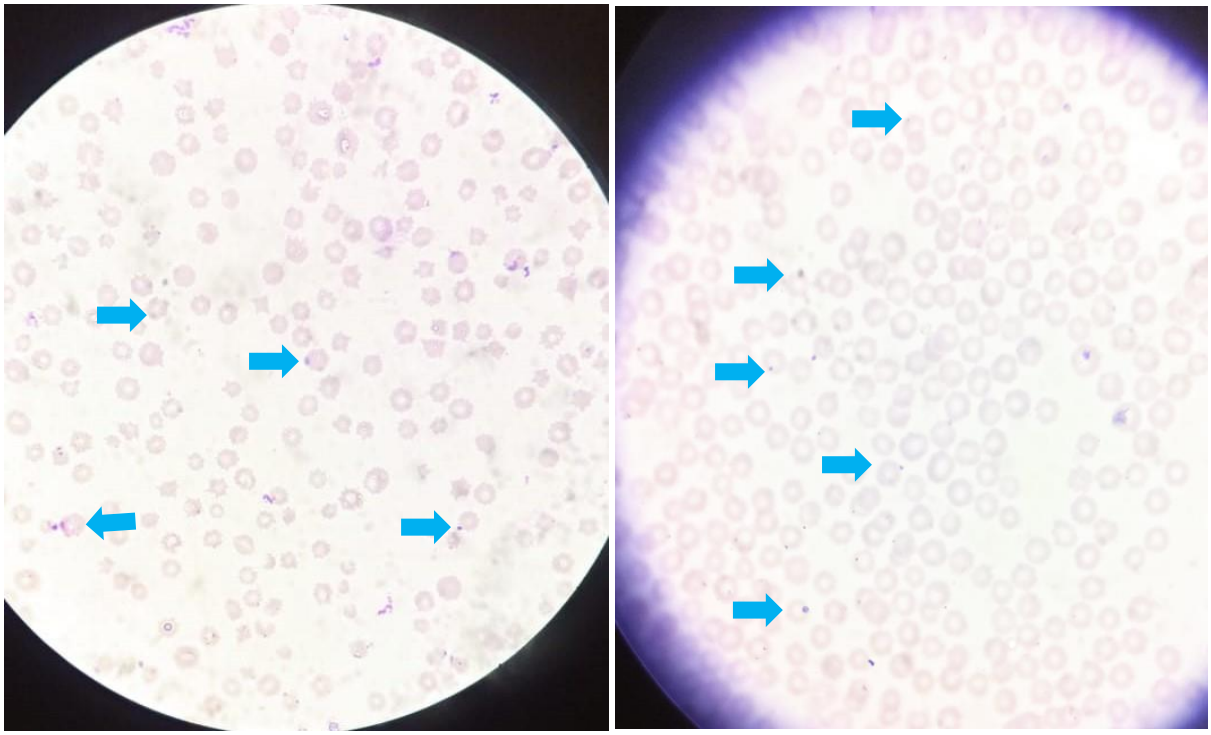

Figure 5: *Anaplasma* organism (Blue indicator) in RBC

CHAPTER IV
DISCUSSIONS

Anaplasmosis frequently occurs in tropical and subtropical regions, and it is a major problem to small ruminants (Ros-García *et al.,* 2013). Epidemiologic studies aimed to determine the prevalence of anaplasmosis uses different diagnostic tools, such as microscopic examination of stained blood smears, serological, and molecular tests. The reliability of the diagnostic tests is crucial for accurate diagnosis and estimation of the disease prevalence. Despite microscopic examination and serologic tests are practical and reliable diagnostics to detect *Anaplasma spp*. infection, they have limitations (Woldehiwet, 2010). The accuracy of stained blood smear examination can be hindered by the low number of infected cells, lack of expertise of the examiner, and/or the occurrence of intracellular artifacts (Bakken *et al*., 2001). In the early acute phase of infection, serologic assays have limited value, due to the absence of detectable antibodies.

Our results showed that the number of infected animals by *Anaplasma spp.* was 7.89% when examined microscopically. The study result is almost identical to that of the earlier study conducted in Greece where Immunofluorescence Antibody Test was used. The variability of infection rates determined by different methods may be attributed to several factors as, age, gender, and species. Previous studies have shown that some cases of anaplasmosis might be missed depending on the detection method used (Nazifi *et al.,* 2008).

Between 1998 and 2000, researchers examined the frequency of *Anaplasma* infection in sheep and goats in the Mashhad suburb of Khorasan province, Iran (Hashemi, 1997). A total of 391 sheep and 385 goats from 77 flocks underwent a clinical examination to check for tick species on the animals' bodies and the presence of *Anaplasma* blood smears. According to the study, 14.8% of goats and 26.1% of sheep had *Anaplasma* infections.

Anaplasmais routinely diagnosed by microscopic examination of Giemsa-stained blood smears and detection of intraerythrocytic *Anaplasma* inclusions. Microscopic examination is suitable for diagnosis of acute anaplasmosis, but it is not applicable for the detection of pre-symptomatic or carrier cases due to low numbers of *Anaplasma* infected cells in circulation, which falls below the detection limit (De Waal, 2012).

CHAPTER V

LIMITATIONS

- The duration of the study was short.
- During the study, farmers were not so cooperative.
- Throughout the study period, no follow-up was conducted.

CHAPTER VI

CONCLUSION

The study described the current state of Anaplasmosis at Kashiani Upazilla in Gopalganj district. Even so, only three cases were discovered to be positive, accounting for 7.89% of goat cases; adult goats are significantly more vulnerable than younger ones. It is acknowledged that areas with an excess of vectors may have a higher prevalence of Anaplasmosis. Nevertheless, it was shown that Oxytetracycline and Imidocarb dipropionate were found more effective. Fluid therapy as well as vitamin supplements were also effective in the recovery of infected animals.

CHAPTER VII

RECOMMENDATIONS

- Additional research with sufficient time is required.
- A thorough epidemiological investigation is necessary.
- Farmers need to understand the significance of blood parasites.
- It is necessary to administer vaccinations and control ticks properly.

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BIOGRAPHY

I am Md. Monzurul Hasan. I was born in Kachua, a remote area of Bagerhat district. I passed my Secondary School Certificate (SSC) examination from Mobaidul Islam Secondary School, Bagerhat in 2013 and Higher Secondary Certificate (HSC) examination from Kachua College, Bagerhat in 2015. I enrolled for Doctor of Veterinary Medicine (DVM) degree in Chattogram Veterinary and Animal Sciences University (CVASU), Chattogram, Bangladesh in 2015-2016 session. In the near future, I would like to work and have massive interest in Animal Welfare and Veterinary Ethics.