Haematobiochemical changes in subclinical mastitis affected high yielding dairy cows in Chittagong district

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ABSTRACT

The study was conducted to determine the hematobiochemical changes in sub-clinical mastitis of high yielding varieties dairy cows in Chittagong district. A total of 21 blood and milk samples were collected from Nahar, Rubel, Friends, Wahid, A.S. dairy farms in Chittagong district for the study. The sub-clinical mastitis were diagnosed by California Mastitis Test (CMT). The overall prevalence of sub clinical mastitis was found almost 30.95% of dairy cows in Chittagong district. Blood and milk of affected cows and control group were analyzed for hematological, biochemical and mineral profile. Haematology of animals revealed significantly (P< 0.05) lower average values of ESR, RBC, WBC, PCV and Hb in infected animals (1±0.654) than healthy animals (1.21±0.425). Differential leucocytes count revealed higher neutrophil and lymphocyte, monocyte and basophil count in infected cows than control cows. Mineral estimation revealed significant (P< 0.05) increase in calcium and phosphorus level in mastitis cows as compared to healthy control, however, no significant (P> 0.05) change was observed in Mg level. The changes of hematological constituents are important indicators of the physiological or pathological state of the animal.

Key words: Hematobiochemical changes, sub-clinical mastitis, California mastitis test.

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INTRODUCTION

In Bangladesh, livestock is one of the most potential sub-sectors of agriculture which plays an indispensable role in promoting human health and national economy of the country. Rapid population growth and urbanization as well as change in diet are the most obvious reasons for increase in the demand for milk and milk products in developing countries (Delgado et al, 2001). The high-yielding dairy cow produces a lot of milk; and the main emphasis for dairy farmers is to sell as much milk as possible with maximum efficiency, both financially and in terms of animal welfare. In Bangladesh, both intensive and household rearing cattle are suffered from various metabolic diseases during different stage of production. But laboratory investigation is merely done to know the status of hematological and biochemical parameters of dairy cattle related to production stage and diseases. Routine examination of blood and serum is necessary for monitoring the health status of cattle.

Mastitis is an inflammation of the mammary gland of dairy cows accompanied by physical,

pathological and bacteriological changes in milk and glandular tissue. In the present state of knowledge it seems practicable and reasonable to define mastitis as a disease characterized by the presence of significantly increased leucocytes content in the milk from affected gland (Blood et al., 1989). The disease is common high yielding dairy cows. Infection rate is more in successive lactation than the first lactation .Exotic and cross breeds cow are more prone to mastitis. Due to improved breeding the cow udder has to undergo rapid changes in relation to size, position and adjustment for rapid removal of large volume milk and as such it is prone to injury and infection (Gibbons et al., 1970). Mastitis may be clinical or sub-clinical, with subclinical infection preceding clinical manifestation .Yet the relationship between the two within a herd is not predictable (Rolands and booth et al., 1988).The prevalence of clinical mastitis in dairy cows of Baghabari ghat , Sirajgong has been reported to be 16% (Al-Shawabkeh et al .,1987) recorded the incidence of mastitis was found to be increased with number of lactation . Mastitis is the one of the most costly disease affecting dairy cows. It has been estimated that mastitis reduced milk yield by approximately 2% and butter fat by 25% in affected cattle as a compared to normal one The milk of the infected cow is unfit for the human consumption. In India financial loss due to incidence of blind teat as a result of mastitis and loss of milk from clinical case of mastitis has been estimated as 92.57 cores of taka every years (Dhanda et al., 1946).The prevalence of mastitis of clinical (13.3%) and sub clinical(15.8%-19.5%) in dairy cattle of Bangladesh. The prevalence of sub clinical mastitis in milch cows have been reported to be 16.52%with White slide test (WST) and 15.77% with California mastitis test (CMT) from Baghabarighat , Sirajgong district by Prodhan et al., (1996) and 18.5% with WST from the greater Mymensingh district by Rahman et al., (1997). Considering the above facts the present study was conducted with aim to detect the prevalence of subclinical mastitis in cows and to estimate the relationship between blood parameters changes during subclinical mastitis.

MATERIALS AND MATHODS

Selection of Farm

Chittagong area is potential for dairy farm because of its high demand of fluid milk, suitable weather, feeds and fodder availability, available veterinary facilities from Chittagong Veterinary & Animal Sciences University. Nahar dairy farm, Wahid dairy farm, A.S. dairy farm, Rubel dairy farm, Friend dairy farm was selected for conducting the study.

Study population

Study population was 21 cross bred multiparous (HF X Local, Shahiwal X Local, HF x Shahiwal X Local.) milking cows. Cows were in different age and production status.

Sample collection and processing

Blood sample was collected from jugular vein of the selected dairy cows. Blood samples were transported to the laboratory at the department of Physiology and Biochemistry of CVASU within one hour keeping in a thermo flask with ice & then fresh blood was examined for TEC, DLC, Hb%, RBC, WBC and PCV% and remaining blood were used for calcium, magnesium and phosphorus estimation. The serum was separated from the blood and stored at 4°C until use.

Hematological and Biochemical analysis

Different hematological parameters were studied according to the methods described by Sastri (1985). Calcium, phosphorus, magnesium was determined by Automated Analyzer established in physiology lab of Chittagong Veterinary and Animal Sciences University.

Data analysis

The data obtained were imported, stored and coded according to recorded information in the questionnaire regarding Infectious and non infectious diseases in high yielding variety dairy cow in the data sheet using the Microsoft Excel-2007 program. These data were brought to the SPSS 16.0 for t-test. The level of significance was determined at $P<0.05$.

RESULTS AND DISCUSSION

In this study most periperturent events was Mastitis. In maximum dairy farm in high yielding variety mastitis is common. Maximum cases of mastitis were found in Nahar dairy farm.

Figure 1
Detection of subclinical mastitis by CMT test.

Table 1
Prevalence of sub clinical mastitis in the different dairy farms in Chittagong region.

Name of the farm	Milk sample	Positive result	Prevalence
Nahar Dairy farm	6	3	50%
Wahid dairy farm	10	3	30%
A.S.dairy farm	9	3	33%
Friends dairy farm	8	2	25%
Rubel dairy farm	9	4	44%
Total	42	13	30.95%

The highest prevalence (50%) was found in Nahar Dairy farm followed by Rubel dairy farm (44%). The lowest prevalence was observed in Friends dairy farm. However, total prevalence of subclinical mastitis found 30.95%.

Table 2
Hematological parameters of dairy cows in different farms.

Variables	CMT test	Mean±SD	P value
ESR	Positive	1±0.654	0.547
	Negative	1.21±0.425	
PCV	Positive	27.42±5.223	0.330
	Negative	28.35±5.32	
RBC	Positive	6.85±1.305	0.330
	Negative	7.089±1.332	
WBC	Positive	9.1414±1.741	0.329
	Negative	9.450±1.77	
Hb	Positive	8.30±0.4864	0.101
	Negative	8.92±0.687	
Lymphocyte	Positive	72±4.727	0.067
	Negative	70.50±8.234	
Neutrophil	Positive	15.42±3.4086	0.579
	Negative	14.28±6.47	
Eosinophil	Positive	7.71±3.302	0.558
	Negative	7.571±2.79	
Monocyte	Positive	4.487±3.387	0.943
	Negative	3.928±4.445	
Basophil	Positive	0.4286±o.534	0.125
	Negative	0.2143±0.425	

N = 21

Table 3
Biochemical parameters of dairy cows in different farms.

Variables	CMT test	Mean±SD	P value
Calcium	Positive	12.46±4.00	0.048
	Negative	11.54±1.87	
Magnesium	Positive	3.37±1.429	0.427
	Negative	2.28±1.150	
Phosphorus	Positive	5.78±0.98	0.048
	Negative	4.98±0.53	

Hematological parameters

The erythocyte sedimentation rate (ESR) of subclinical mastitis affected cows was found lower than normal cows. The variation in ESR of the cow of two groups was statistically insignificant (P>0.05). The average ESR in subclinical mastitis affected and normal cows were 1.00 and 1.21, respectively. The results of the present study showed that higher PCV in normal cows (27.42) then affected cows. The PCV was usually in the upper 20s in adult cattle and slightly higher in calves (Navarre Christine, 2007). The present study revealed that Hb concentration in normal cows was higher than infected cows (8.30±0.4864). In female Holstein Cattle Hb% was higher in calves (at 1-14 days old is Hb (gm/dl) 5.7-15.8 , at 2wks -6 months old Hb (gm/dl) 8.5-14.1) than the adult cows (at 2 year +

old is Hb (gm/dl) 8.5-13.2) (Lumsden et al ., 1980). The Red blood corpuscles (RBC) of subclinical mastitis affected cows were found lower than normal cows. The relation in RBC of the cow of two group was statistically insignificant (P>0.05).The average RBC in subclinical mastitis affected and normal cows were 6.89 and 7.09 respectively. The relation in WBC of the cow of two group was statistically insignificant (P>0.05).The white blood corpuscles (WBC) of subclinical mastitis affected cows were found lower than normal Cows. The average RBC in subclinical mastitis affected and normal cows were 9.14 and 9.450 respectively. Zaki et al. (2010) reported that anaemia in mastitic cows was due to decrease in Hb, RBC, and PCV levels. Increased TLC with increase in absolute number of monocytes, eosinophils and neutrophils in mastitis were reported by Zaki et al. (2008) and Khan et al. (1997).

In this study the total differential count is lower in normal cows than subclinical mastitis cows. Though it was insignificant but it may be due to nutritional deficiency that occurs in starvation or anorexia that cause neutropenia (Spivak et al., 1984). Eosinophil was higher in cows and it was significant. Possible causes of eosinophilia in cows were parasitic infestation (Davidson et al., 1998; Candyce et al., 2003). Differences in Basophil were not significant.

Biochemical parameters

Calcium level found in infected cows was 12.46±4.00mg/dl and 11.54±1.87mg/dl in non infected cows. Lower percentages in lactating cows may be due to calcium losses during milk production. In older animal there was a decreased need for calcium and phosphorus for this purpose and this was why lower calcium level in blood levels of cows (Doornenbal et al., 1988). The variation in calcium of the cow of two group was statistically significant (P<0.05).

Magnesium level of subclinical mastitis affected cows was found lower than normal cows. The variation in magnesium of the cow of two group was statistically insignificant (P>0.05). Magnesium level of the plasma samples showed no significant effect of mastitis (Singh et al.,

2014). Dwivedi et al. (2004) and Yildiz and Kaygusuzoðlu (2005) also reported no significant variation in the plasma level of Mg in mastitic and healthy animals. Compared with present study Singh (1999) reported significantly (P< 0.05) higher average values of Mg in acute mastitic buffaloes.

There was an increase in phosphorus level in infected cows 12.46±4.00 mg/dl whereas the normal cows having 11.54±1.87 mg/dl. The variation in phosphorus of the cow of two group was statistically significant (P<0.05) which could be attributed to its more secretion in milk, due to injury to the udder wall, thus more loss in milk. Finding corroborates with the observation of Dwivedi et al. (2004).

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