

Status of Parturient Paresis (Hypocalcaemia and Milk Fever) on Dairy Farm in Addis Ababa City, Ethiopia

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Abstract: A prospective follow up study was conducted in Addis Ababa town attends on different selected farms for fifteen months from January 2015 to April 2016. The aims of this study were to determine the current status of parturient paresis, associated risk factors, and to estimate the economic loss of parturient paresis that is attributed in dairy herds. Parturient paresis is a condition of third to sixth lactation of high-producing dairy cows. It is associated with parturition, usually within 72 hours of giving birth. Because of the high volume of milk produced during this time and subsequent demand for calcium, these cows often develop hypocalcaemia. During the study a total 532 pregnant cows was followed on different farms with different gestation period. Among the total 532 cows 145 (27%) had affected to parturient paresis, from these, 103 cows (71.15%) showed rapid responses to a single bottle of calcium borogluconate and 14 (9.66%) cows of the cases failed to show responses for calcium borogluconate and all of them died due to ruminal bloat and complete paralysis of respiratory muscles. The prevalence of parturient paresis showed statistically significant difference between number of parity (58%), average production level per day (39%), breed (37%) and time of occurrence (31%; $P < 0.05$). However, all over results there was no statistically significant difference noted among the herd size, farming system, previous parturient paresis and farm hygiene ($P > 0.05$). This study demonstrated that parturient paresis is common in dairy farms in Addis Ababa city and that some of the associated risk factors can be addressed by practical management of dairy cows.

Key words: Cow • Addis Ababa • Parturient Paresis • Calcium Borogluconate • Dairy Farm

INTRODUCTION

Amongst domestic farm animals, the metabolic diseases achieved their greatest importance in dairy cows. The high producing dairy cows always verge on abnormality because the breeding and feeding of dairy cattle for high milk yield etiologically related to the diseases of metabolism so common in these animals. In dairy cows, the incidence of metabolic diseases increased in the period commencing at calving and extending until the peak of lactation and this susceptibility appears to be related to the extremely high turnover of fluids, salts and soluble organic materials during early lactation [1].

Parturient paresis, also known as post-parturient hypocalcaemia, or milk fever which results from severe hypocalcaemia, is one of the metabolic diseases occurring most commonly in adult cows within 48 hours after

parturition, but it may occur several weeks before or after parturition. On the day of parturition, dairy cows commonly produce 10 liters or more of colostrums containing 23 g or more of calcium, approximately 6 fold as much calcium as the extracellular calcium pool contains. Most animals adapt to the onset of lactation by rapidly increasing intestinal calcium absorption and bone calcium resorption mechanism activity, permitting replacement of extracellular calcium lost to lactation. In some cows, the calcium homeostatic mechanisms of the body fail to adequately replace calcium lost from the extracellular calcium pool as a result of lactation. These animals become severely hypocalcemic, which disrupts nerve and muscle function, resulting in recumbence and clinically characterized by hypocalcaemia. Most cows recover after a single treatment. However, approximately 20% of parturient paretic cows recover after calcium treatment [2].

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Cows that recover from parturient paresis are less productive and more susceptible to other health disorders such as ketosis, mastitis, retained fetal membrane (RFM), displaced abomasums and uterine prolepses'. Besides, most of untreated cows with parturient paresis die within a day. Parturient paresis is estimated to occur at the rate of 5-10% in USA and the economic loss for treatment and loss in milk production was estimated at 334 USD per occurrence [3]. Therefore, the objective of this survey were to determine current status parturient paresis in dairy herds, creation of awareness among dairy farmers about the importance of parturient paresis and to assess associated factors of the pathogens that needs to be further investigation.

MATERIALS AND METHODS

Study Area: Addis Ababa is the capital city and administration center for the Federal Democratic Republic of Ethiopia. Currently there are 10 "Kifle Ketemas" in Addis Ababa city administration delineated on the basis of geographical set up, population density, asset and service providers' distribution and convenience for administration. Addis Ababa is situated at latitude of 9°3'North and 38°43'East. It lies in the central highlands of Ethiopia at an altitude of 2500 m.a.s.l. It has an average rainfall of 1800 mm per year. The annual average maximum and minimum temperature is 26°C and 11°C, respectively; with an overall average of 18.7°C. Highest temperatures are reached in May. The main rainy season extends from June to September. Addis Ababa has a relative humidity varying from 70% to 80% during the rainy season and 40% to 50% during the dry season. The human population is estimated at about 3 million inhabitants [4].

Study Design: Based on a cross-sectional (Prospective) descriptive survey was the design of the study to determine the status of parturient paresis.

Study Animals and Their Management: This study was conducted on private owned dairy cows in Addis Ababa town from January 2015 to April 2016. The study included a total of 532 cows of two breeds i.e. cows with >50% of blood level of Jersey cross bred and cows with > 50% of blood level of Holstein Friesian. In Addis Ababa town cows were managed intensively indoor system where animals were housed and watered and fed indoor. The animals ration contained hay, wheat bran and crop residue and/or oil seed cakes.

Questionnaire Survey: Information was collected by regular farm visits and using pre-designed questionnaires regarding the animals housing, feeding, reproductive traits, breeds, milk yield, AI period, numbers of parity, previous history of parturient paresis and time of occurrence the disease with respect to parturition.

Clinical Observation and Examination: Regular farm visits were made to the dairy farms in Addis Ababa town and to follow up preparturient cows and subsequent development of parturient paresis or hypocalcaemia. Also, parturient paresis cases were obtained and followed up by visiting farms when dairy owners made calls or came to veterinary clinics to get a veterinary service for cows that fall with hours after calving. Clinical examination of the comatose and recumbent cows, the condition of the cows, signs and symptoms manifested and other relevant information associated with the disease were recorded.

Therapeutic Response: A follow up study was made on those clinically diagnosed parturient paresis cases after treatment with calcium borogluconate. Rapid responses, failure to therapy or reoccurrence also were recorded.

Data Analysis: The data was presented using the cross-sectional descriptive statistics. The association between parturient paresis and risk factors such as breed, parity and milk yield etc were analyzed using chi square (X^2) test.

RESULTS

Survey Results: This study included 97 farms with a total of 532 cows whose owners were willing to cooperate. Using this opportunity, the farms were included in the study to make a case followup study. Overall the prevalence of parturient paresis was 27%. In Addis Ababa town there were farms in average having 10 cows owned by private owners. Most urban dwellers keep 3-25 numbers of cows for milk production and replacement of the lactating cows. The result of questionnaire survey and farm visits showed that most of the cows affected by parturient paresis were house fed supplemented with concentrates (Oil seed cakes and wheat bran). Mostly the cows affected with the disease had good body condition score and were housed in separate concrete pens. The dairy farm owners know very well about the nutrient composition of the various feeds such as "Noug" seed, cake, linseed cake and white bran but his complain the cost of feed. The owners simply mix oil seed cakes and

Table 1: Uni-variates logistic regression of the risk factors for the prevalence of parturient paresis

Variables	Levels	No. of	Positives	Proportion	χ^2 -value	P-value
		Cows				
Lactation per Day/liters	< 20	203	42	21.83	15.18	0.0011
	20-25	186	47	25		
	> 25	143	56	39		
	Total:	532	145	27		
Parity	< 3	198	31	15	72.89	0.000
	3-4	221	48	21		
	≥ 4	113	66	58		
	Total:	532	145	27		
Occurrence	Before calving	205	42	20.48	7.63	0.025
	During calving	327	103	31		
	Total:	532	145	27		
Breed	H. Friesian crosses	430	107	24	24.71	0.001
	Bred (≥50% blood)					
	Jersey crosses bred (≥50%)	102	38	37		
	Total:	532	145	27		
Herd Size	<5	140	41	29	0.49	0.210
	5 ≤ 15	245	66	26		
	≥ 16	147	38	25		
	Total:	532	145	27		
Farm hygiene	poor	123	37	30	0.69	0.150
	Good	409	108	26.4		
	Total:	532	145	27		
Farm system	Semi-intensive	182	42	23	2.49	0.10
	Intensive	350	103	29.42		
	Total:	532	145	27		
Previous-parturient Paresis	Yes	99	22	22.22	1.59	0.20
	No	433	123	28.40		
	Total:	532	145	27		

Overall calculation: for $\chi^2 = 15.18, 72.89, 7.63$ and 24.71 at $p < 0.05$ showed statistically significance difference between the risk factors and the disease, however $\chi^2 = 0.49, 0.69, 2.49$ and 1.59 at $p > 0.05$ these, no statistically significance difference between the risk factors and the disease.

wheat bran with brewery by-product and feed the animals. All visited farms allowed water for their animals' *ad labium* and mineral bricks. There was a strong association ($P < 0.05$) between parturient paresis and parity. High prevalence of parturient paresis increased with the increases of parity. The occurrence of parturient paresis in relation to number of calving, milk yield and breed of the cows and time of occurrence (Before and after calving) has been tested statistically. Table 1 showed that the relative occurrence of parturient paresis in association with milk yield per day, parity and breeds. This study showed that all cases of parturient paresis in Addis Ababa dairy cows occurred within 72 hours after parturition. The occurrence of parturient paresis was significantly associated ($p < 0.05$) with milk yield (Table 1). It was higher in cows producing more than 25 liters of milk per day. There was also a significant relationship between parturient paresis with parity ($p < 0.05$), and breed ($p < 0.05$).

Cows with $\geq 50\%$ Jersey cows (cross bred) had higher prevalence than those with $>50\%$ Friesian breed (Cross bred).

Therapeutic Responses: From a total of 145 cows affected with parturient paresis 131 (90.34%) of them showed variable response to therapy. Of these 103 cows (71.15%) showed rapid responses to a single bottle of calcium borogluconate (400ml, 1%) and the rest 28 (19.19%) cows had relapse after first therapy and additional dosage was needed. From these, 14 (9.66%) cows of the cases failed to show responses died due to ruminal bloat and complete paralysis of respiratory muscles.

DISCUSSION

This study showed that the prevalence of parturient paresis was 27% in a total of 532 milking cows in Addis

Ababa dairy farms. Most of the literatures suggest that when the prevalence of parturient paresis increases above 10% in their third or latter lactation, considerations should be given to a specific control program PMC US National Library of Medicine [5]. Therefore, these results indicated that control methods are required to avoid loss due to parturient paresis.

According to Samuel *et al.*[1] parturient paresis is caused by a severe deficiency of metabolizable calcium ion in the circulation. This could be attributed due to several risk factors such as study incidence include 55 (50.92%), 66(73.3%) and 110(31.9%) milk yield, parity and breed of the cows respectively. The occurrence of parturient paresis was strong significantly associated with parity =4 because from a total of 145 cows affected with parturient paresis 66 (58%) occurred within 72 hours after calving. From our results, milk yield appeared to be an important risk factor because of parturient paresis 56 affected cows (39%) were producing >25 liters of milk per day. From 430 H. Friesian crosses breeds examined cows, only 107 (24%) had parturient paresis and from 102 Jersey crosses breeds cows examined only 38 (37%) showed the disease and this that Jersey crosses breeds cows are more susceptible to parturient paresis than Friesian crosses breeds. Similarly results the time of occurrence showed depend on parturition because from a total of 145 cows affected with parturient paresis 103 (31%) occurred during calving. This could be attributed to calving high numbers of parity and low ability to maintain calcium homeostasis in Jersey crosses breeds cows compared H. Friesian crosses breeds. Serum calcium level falls in all adult cows at calving due to the onset of lactation. Within a breed, the level of fall may be high in some cows compared to others and such individual variation results variation to susceptibility of animals to parturient paresis and also response to treatment.

In summary, almost all cows with parturient paresis were kept indoor with zero grazing. If extremely low calcium diets (<20 grams of daily calcium) are fed before parturition and high-calcium diets are fed after parturition, the incidence of milk fever can be drastically reduced Green *et al.* [4]. Also, cows underwent this study were provided with oil seed cakes (Lin seed cake and noug seed cake), Wheat bran and teff straw and barely straw. All cows which responded to treatment with calcium borogluconate were variable with some relapses that required treatment for three successive days however, all untreated cows died within 12-24hours after the onset of clinical signs Samuel *et al.* [1].

CONCLUSSIONS

In conclusion, the results of this study showed that parturient paresis is considered one of the major production disease in Addis Ababa. Parity, milk yield, breed and time of occurrence are some of the factors which contribute to the occurrence of parturient paresis on the study area. Having the above conclusions, the following recommendations are forwarded: Availability of the drug to treat the cases should be insured among the expected governmental and non-governmental veterinary health clinics throughout the year. The owners of dairy farms and private animal owners should be aware of the disease and prepare themselves how to manage per-partum intake of calcium. Government officials of the respective sector in the town should give attention to parturient paresis and should make the drugs (e.g. calcium borogluconate, calcium oral gel etc.) available in the market at reasonable costs. Even herds with successful anionic salts programs and minimal cases of parturient paresis will benefit from strategic use of oral calcium supplements.

ACKNOWLEDGMENT

I would like to extend my gratitude to City of Addis Ababa Arada Sub City Administration Trade Office Agriculture Core process for the grant release for this project and private owners of farms, for willing to cooperate.

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