



Original Research Article

Effect of parity on the peripartum hypocalcaemia In dairy cows under Egyptian conditions

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ABSTRACT

A total of 30 dairy cows were attended in veterinary practice investigations have been done under Egyptian conditions, in Seds farm belong to animal production research institute, from the reproductive perspective. The study divided the animals according to parities to - one parity, two parity, three parity and more than three parity. The study followed values of some biochemical parameters glucose, calcium, phosphorus, potassium, sodium, cholesterol, triglyceride, albumin, total protein and urea. showed that cows affected by hypocalcaemia. The most important notifeibal results in postpartum 1-7 days the calcium level of cows with parity one calcium level were 7.06 gm /dl while in cows with parity two were 6.64 gm/dl, in cows with three parity 6.6 gm /dl and cows more than three parity calcium level were 6.91 gm/dl. 14-21 days post partum. 4 cows with parity one calcium level were 7.46 gm /dl, first parity cows has along interval from calving to estrus, days open and number of services. cows with parity two has along period to come in first estrus at 86 ± 5.6 s days and long days open which were 106 ± 4.7 days. But NO. of services were high in cows with more than three parity 1.9 ± 0.16

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1. Introduction:

The main metabolic disorders of the fresh cow (at calving time) are : -milk fever ,ketosis ,fat cow syndrome ,retained placenta, displaced abomasum, rumen acidosis ,laminitis, dairy farming has only one aspiration, higher production, with the consequence of decreased fertility. Average conception rate with the first insemination is lower than 40% (**BUTLER, 2000; BOUCHARD and TREMBLAY, 2003**).

The peripartum dairy cow undergoes many complex changes in metabolism during the transition from late gestation to early lactation. Maternal tissues begin this adaptation process during late gestation to meet the demands of the fetus, but the adaptation becomes even more pronounced during early lactation. **Kennerman E. and Kaya G. (2002)**.

Parturient paresis is a metabolic disorder that negatively affects productivity of lactating dairy cows. This metabolic disorder potentially reduces the productive lifetime of a dairy cow by 3.4 yr and may increase the risk of other metabolic disorders such as mastitis or uterine prolapse after calving (**Horst et al., 1997**).

The peripartum or transition period for a dairy cow begins 2–3 weeks before calving and lasts until 2–3 weeks after calving. This period is characterized by physiological, metabolic and nutritional changes that are often accompanied by the onset of metabolic disorders (**Stevenson and Call, 1988; Goff and Horst, 1997**) and the impairment of host immune function (**Waller, 2000**).

Hypocalcaemia develops as a result of the sudden drain of calcium to colostrum at the onset of lactation, resulting in a tremendous challenge to the cow's ability to maintain normal calcium levels in blood. hypocalcaemia after calving may affect organs that have

smooth muscle function such as the uterus, rumen and the abomasum (stomach).a significant association between parturient hypocalcaemia, dystocia and retained fetal membranes in dairy cows, has been reported(**Curtis et al.1983, Curtis C.R., et al.1985, Grohn et al 1990**)

The aim of the present work is mainly directed to study the following :follow up the incidence of post partum metabolic disorders and its relationship by the animal status also follow up the reproductive status of the dairy cows and its association with post parturient metabolic disorders .

2. Materialand methods

Animals

A total of 30 cows were attended in veterinary practice in Beni Suef governorate .the cows under study were clinically examined including complete gynecological examination before the study. individual data were recorded for each cow in the working sheet :- 1-case number .2 -parity 3 -body condition score4-heamoglibein concentration gm/dl (Hb)5- total leukocyte count (WBCs)6- Glucose level mg/dl 7- Calceium level mg /dl,8- Phosphorus level mg /dl,9- Potassium level mg/dl,10- Sodium level mg /dl,11- Progesterone level ng/dl ,12- triglyceride level mg/dl,13- Cholesterol level mg/d,14Albumine level gm/dl,15- Total protein level gm/dl,16- Urea level mg/dl 17- ketone bodies and18- post parturient metabolic disorders :key numbers were 1

Parity :- - one parity , two parity , three parity and more than parity three

Fertility indices: pregnancy diagnosis for cows were occurred at 45-60 days post insemination. the fertility indices were 1-interval from calving to first estrus per days , 2-number of services

per conception and 3-Days open as the calving to conception intervals per days

The blood samples were collected from the jugular vein, sample with anticoagulant (EDTA) for haematological tests, 2 ml with sodium fluoride for glucose determination and the third part of blood sample without anticoagulant for separation of serum to biochemical analysis to determination of calcium, phosphorus, potassium, sodium, cholesterol, triglyceride, albumin, total protein and urea. biochemical analysis were determined by automatic absorption spectrophotometer (Erba chem 7)

Urine samples for determined the ketone bodies.

The biochemical test were determined by automatic absorption spectrophotometer (Erba chem 7 made in Germany)

Haemoglobin concentration (gm/dl) measured by using reagent produced by Daimond reagent. according to *Van Kampen EJ (1961)*. WBCs count was determined using phase contrast microscope according to *Howkey and Dennett (1989)*. Glucose determination (mg/dl) by using reagent from Spinreact company according to *Trinder P. (1969)* Calcium (mg/dl) were determined by using reagent from Spinreact company according to *Kessler G (1964)*. **Phosphorus** (mg/dl) were determined by using reagent from Spinreact company according to *Daly J A. (1972)* **Potassium** (mg/dl) were determined by using reagent from Spinreact company according to *Sunderman and Sunderman, (1958)*. **Sodium** (mg/dl) were determined by use reagent from Spinreact company according to *Trinder, (1951)*. **Triglyceride** level (mg/dl) were determined by using reagent from Spinreact company

according to *Buccolo G (1973)*. **Cholesterol** level (mg/dl) were determined according to *Meiattini F. (1978)*. **Albumine** level (g/dl) were determined by use reagent from Spinreact company *Rodkey F L. (1965)*. **Total protein** level (g/dl) were determined according to *Kaplan A (1984)* by using reagent from Spinreact company. **Urea** level mg/dl (mg/dl) were determined by *Kaplan A (1984)* using reagent from Spinreact. **keton** bodies estimated by using Medi-Test Glucose /keton their intensity were distinguished: none (-), traces (+/-), positive (+) and strongly positive (++/+++). progesterone was measured radioimmunoassay (RIA) kit According to Mayes, (1970).

Statistical analysis :

Statistical analysis were conducted according to *SPSS, (1997)* and *Duncan's, (1955)*

3. Results

Metabolic disorder in calcium compared with parity in cows after 1 to 7 days pre partum

30 cows with hypocalcaemia as a metabolic disorder. the calcium level of These cows (30 cows) 7- 1days pre partum were 5(16.66%) cows with parity one calcium level were 8.5 mg /dl while in 7 cows(23.33%) with parity two were 8.42 gm/dl, in 7 cows (23.33%) with three parity were The most important notifeibal results 8.22 mg /dl and 11 cows (36.66%) more than three parities calcium level were 8.30 mg /dl. as in table (1).

Post partum metabolic disorder in calcium compared with parity in cows after 1-7 days post partum

The most important notifeibal results in Post partum 1-7 days the calcium level of These cows 5 cows with parity one calcium level were 7.06 mg /dl while in

7 cows with parity two were 6.64 mg/dl, in 7 cows with three parity 6.6 mg/dl and 11 cows more than three parity calcium level were 6.91 mg/dl. 14-21 days post partum 4 cows with parity one cows calcium level were 7.46 gm/dl while in 7 cows with two parity were 7.28 mg as in table (2), in 7 cows with three parities 7.21 two /dl and 11 cows more than three parities calcium level were 7.39 mg/dl.

Post partum metabolic disorder in calcium compared with parity in cows after 14 to 21 days post partum

At 14-21 days post partum one parity cows with calcium were 7.46gm/dl body condition score were 2.65, Hb % Were 11.08g/dl, total leucocytes count were 5580 glucose level were 42.6mg/dl , Ph were 4.9 mg/dl , K were 5.1 mg/dl , Na were 140.6 mg/dl, 0.44ug/ml progesterone ,triglyceride 25.2mg/d cholesterol 128.8mg/d, Albumin 3.74g/d ,total protein 7.38g/dl urea 22.2mg/dl as in table (3). Cows at 14-21 days post partum two parity cows with body condition score were 2.75 ,Hb % Were 11.6, total leucocytes count were 5810, calcium were 7.28mg/dl glucose level were 38mg/dl , Ph were 5.01 mg/dl , K were 5.5mg/dl, Na were 137 mg/dl, 0.46ug/ml progesterone, triglyceride 27.4mg/d, cholesterol 134.1mg/d, Albumin 3.48g/d, total protein 6.9g/dl urea 21.1mg/dl as in table (3). Cows at 14-21 days post partum three parity cows with body condition score were 2.71, Hb % Were 10.7, total leucocytes count were 5750, glucose level were 40mg/dl calcium were 7.28mg/dl, Ph were 4.41 mg/dl , K were 5.43 mg/dl, Na were 141 mg/dl, 0.44ug/ml progesterone, triglyceride

24.1mg/d, cholesterol 134.5mg/d, Albumin 3.37g/d ,total protein 6.7g/dl urea 21.5mg/dl as in table (3).

Cows at 14-21 days post partum cows with more than three parity body condition score were 2.77 ,Hb % Were 10.45, total leucocytes count were 5461, glucose level were 38.8mg/dl, calcium were 7.39mg/dl , Ph were 5.81 mg/dl , K were 5.12 mg/dl , Na were 143 mg/dl, 0.54ug/ml progesterone ,triglyceride 24.54mg/d, cholesterol 132.4 mg/d, Albumin 3.27g/d ,total protein 6.9g/dl urea 22.1mg/dl as in table (3).

Effect of hypocalcaemia on different metabolic parameters and fertility incidence

Cows with parity one first estrus occur at 72.2 ± 8.0 s days while days open were 86.8 ± 6.2 days with 1.6 ± 0.26 NO. of services. cows with parity two first estrus occur at 86 ± 5.6 s days while days open were 106 ± 4.7 days with 1.85 ± 0.3 NO. of services. cows with parity three cows first estrus occur at 76.5 ± 6 s days while days open were 92.1 ± 6.8 days with 1.7 ± 0.3 NO. of services. cows with more than three parity first estrus occur at 79.7 ± 20 s days while days open were 93.1 ± 5.2 days with 1.9 ± 0.16 NO. of services as in table (3).

Table 1: metabolic disorder in calcium compared with parity in cows after 1 to 7 days pre partum

Case NO.	Parity	BCS	HG gm/dl	WBC S count	Glucose mg/dl	Ca mg/dl	Ph mg/dl	K mg/dl	Na mg/dl	Proge ster ng/ml	Trig mg/dl	Cholist mg/dl	Alb g/dl	T.P. g/dl	urea mg/dl	k. bodies	Poss.paritDisorde rs
5	1	2.95 ^a ±0.22	11.64 ^b ±0.35	6050 ^a ±339	48.2 ^b ±2.7	8.5 ^b ±0.2	6.0 ^b ±0.12	4.9 ^a ±0.3	137.4 ^b ±1.7	2.36 ^a ±0.2	33.2 ^a ±3.1	162.4 ^b ±4.6	3.72 ^b ±0.18	7.5 ^b ±0.3	21.4 ^a ±0.24	+	1
7	2	3.07 ^a ±0.1	11.9 ^b ±0.13	6541 ^b ±154	46.1 ^{ab} ±2.1	8.4 ^{ab} ±0.2	5.7 ^{ab} ±0.12	4.8 ^a ±0.32	130.8 ±3.0	2.31 ^a ±0.24	43.85 ^b ±2.6	155.5 ^a ±4.3	3.48 ^a ±0.12	6.9 ^a ±0.16	21.1 ^a ±0.55	+	1
7	3	3 ^a ±0.21	11.24 ^a ±0.28	6277 ^b ±118	44.7 ^a ±1.5	8.22 ^a ±0.20	5.4 ^a ±0.15	4.7 ^a ±0.30	137.7 ±1.7	2.24 ^a ±0.19	38.28 ^{ab} ±2.2	155.8 ^a ±2.05	3.74 ^b ±0.04	6.87 ^a ±0.38	22.4 ^{ab} ±0.89	+	1
11	>3	3.04 ^a ±0.17	11.18 ^a ±0.2	6009 ^a ±184	44 ^a ±1.4	8.30 ^a ±0.08	5.1 ^b ±0.13	5.17 ^b ±0.17	137.1 ±1.7	2.56 ^b ±0.14	34.45 ^a ±2.0	156.2 ^a ±4.11	3.61 ^{ab} ±0.10	7.12 ^{ab} ±0.21	23.5 ^b ±0.59	+	1

Within the same column, Values with different superscript litter are significantly different at P< 0.05

Mean values (±SE)

Table 2: Post partum metabolic disorder in calcium compared with parity in cows after 1-7 days post partum

Case NO.	Parity	BCS	HG gm/dl	WBC S count	Glucose mg/dl	Ca mg/dl	Ph mg/dl	K mg/dl	Na mg/dl	Progestin ng/ml	Triglyceride mg/dl	Cholesterol mg/dl	Alb g/dl	T.P. g/dl	urea mg/dl	k. bodies	Poss. parturition disorders
5	1	2.85 ±0.21	10.94 ^a b ±0.50	5570 ±275	42.4 ^b ±1.9	7.06 ±0.17	5.54 ±0.16	5.44 ±0.3	144.8 ±2.4	0.53 ±0.01	22.2 ±1.9	132.8 ±4.5	3.4 ±0.12	7.54 _{±0} .3	22.2 ±0.1	++	1
7	2	3.02 ±0.11	11.24 ±0.15	5238 ±235	35.7 ±2.0	6.64 ±0.19	5.02 ±0.17	5.55 ±0.3	145.7 ±3.3	0.54 ±0.03	27 ±2.5	135.8 ±3.6	3.18 ±0.05	6.71 _{±0} .16	21.0 ±0.5	++	1
7	3	2.96 ±0.2	11.8 ±0.36	6011 ±369	38.8 _{±0} .7	6.6 ±0.32	4.77 ±0.15	5.45 ±0.2	144.2 ±1.2	0.56 ±0.02	25 ±2.4	136.8 ±3.3	3.24 ±0.08	6.55 _{±0} .36	21.2 ±0.5	++	1
11	>3	3 ±0.15	10.24 ±0.2	5725 ±215	36.1 ±1.07	6.91 ±0.25	5.04 ±0.10	5.64 ±0.1	146.1 ±1.8	0.60 ±0.02	20.7 ±0.6	133.3 ±2.9	3.15 ±0.08	6.58 _{±0} .3	22.7 ±0.5	++	1

Within the same column, Values with different superscript litter are significantly different at P< 0.05

Mean values (±SE)

Table 3: Post partum metabolic disorder in calcium compared with parity in cows after 14 to 21 days post partum

Case NO.	Parity	BCS	HG gm/dl	WBC S count	Glucose mg/dl	Ca mg/dl	Ph mg/dl	K mg/dl	Na mg/dl	Progesterone ng/ml	Triglyceride mg/dl	Cholesterol mg/dl	Alb g/dl	T.P. g/dl	urea mg/dl	k. bodies	Poss. parturition disorders	Ist-estt	Days open	No. serv
5	1	2.65 ±0.15	11.08 ±0.58	5580 ±283	42.6 ±2.2	7.46 ±0.19	4.9 ±0.2	5.0 ±0.26	140.6 ±2.6	0.44 ±0.01	25.2 ±1.8	128.2 ±5	3.74 ±0.13	7.38 ±0.3	22.2 ±0.48	+	1	72.2± 8.0	86.8± 6.2	1.6 ±0.24
7	2	2.75 ±0.1	11.6 ±0.18	5810 ±309	38.0 ±1.9	7.28 ±0.21	5.0 ±0.12	5.5 ±0.2	137.4 ±4.8	0.46 ±0.02	27.4 ±2.0	134.1 ±2.6	3.48 ±0.12	6.9 ±0.16	21.14 ±0.55	+	1	86 ±5.6	106 ±4.7	1.85 ±0.34
7	3	2.71 ±0.18	10.7 ±0.4	5750 ±284	40.0 ±1.2	7.28 ±0.23	4.4 ±0.19	5.45 ±0.21	141.3 ±0.9	0.44 ±0.03	24.1 ±1.3	134.5 ±3.7	3.37 ±0.19	6.7 ±0.36	21.57 ±0.57	+	1	76.57 ±6.2	92.14 ±6.8	1.71 0.35
11	> 3	2.77 ±0.13	10.4 ±0.2	5461 ±163	38.8 ±1.1	7.39 ±0.18	5.8± 0.19	5.±0. 16	143.7 ±1.7	0.54 ±0.05	24.5 ±1.3	132.4 ±2.27	3.27 ±0.12	6.9 ±0.3	22.09 ±0.6	+	1	79.72 ±2.7	93.18 ±5.2	1.9 ±0.16

Within the same column, Values with different superscript litter are significantly different at P< 0.05.

Mean values (±SE)

4. Discussion

The current investigation showed that in cows with hypocalcaemia the change of body condition score (BCS) was high in primary cows this attributed to loss of appetite due to low calcium level agreement with those reported by (*Huber et al 1981*) hemoglobin concentration was lower with cows in more than three parity this attributed to the age. the high incidence of lower total WBC count from pre partum to post partum noticed in first parity cows, this attributed to the decrease in levels of Ca and glucose of these cows, this agreement with those reported by (*Staph Leblanc 2010*) .

the results of the present work showed that cows suffering from hypocalcaemia in its post parturient progesterone level were lower in cows with three parity .the incidence of change of albumin and total protein were more decrease in 1-7 days post parturient then beginning to elevate at 14-21 days post parturient this attributed to the parturition and let down of the milk. as reported by *Grummer, R.R. (1996)*.

the effect of parity on fertility parameters for cows suffering from hypocalcaemia

the current investigation showed that cows affected by hypocalcaemia , first parity cows has long interval from calving to estrus ,days open and number of services this attributed to the role of Ca in uterine involution and low immunity as mentioned before this result agreement with those reported by (*Horest et al ,1997, Burim N Ametaj 2006 and Steph Leblanc 2010*)

5. Conclusion

Cows with hypocalcaemia the change of BCS was high in first parity cows. The cows with hypocalcaemia the incidence of change of albumin and total

protein were more decrease in 1-7 days post parturient . hypocalcaemia as a metabolic disorder there effect is more appear for first parity cow decreasing in BCS and cows with parity two first estrus occur at 86 ± 5.6 days while days open were 106 ± 4.7 days cows with more than three parity with 1.9 ± 0.16

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