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Effect of Caesarean Section (C.S) on Uterine Aerobic Bacteria and Post-Partum Period in Nubian Goats

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Abstract: A total of 82 deep cervical swabs were collected from 10 post-parturient Nubian goats. Thirty eight of these swabs were from five Nubian goats which were kidded normally (control group) and 44 swabs were from post-parturient Caesarean sectioned Nubian goats (C.S group). Collection of the swabs, started from the second day after kidding till the goat came into the first observable heat. The bacteria isolated from swabs taken from the two groups of goats reached 104 species belonging to 10 different genera. They included *Bacillus* sp. *Bordetella* sp. *Corynebacterium* sp. *Escherichia* sp. *Gemella* sp. *Klebsiella* sp. *Micrococcus* sp. *Proteus* sp. *Staphylococcus* sp. and *Streptococcus* sp. The organisms which were common between the two groups included: *Bacillus cereus, Escherichia coli, Escherichia fergusonii, Staphylococcus chromogens* and *Streptococcus faecalis*.It was noticed that four goats in the control group were free from aerobic bacteria as early as day 13 and only one goat continued to show these organisms till the occurrence of first oestrus post-partum. However, in the C.S group, four goats continued to host the organisms till the signs of oestrus were observed and only one goat was free from the organisms at day 21. Depending on these finding, the post-partum period in the normally kidded Nubian goats ranged between 13 - 36 days (23.4±8.46) and between 21-41 days (35±8.22) in the C.sectioned Nubian goats and the difference between the two groups was a significant ($p<0.05$). It could be concluded from this study, that C.S. resulted in a significant prolongation of the post-partum period in the Nubian goats with a noticeable change in the aerobic uterine flora.

Key words: Nubian, goat, C.S, bacteria, organism, *Escherichia coli*

INTRODUCTION

Goat breeds differ in the length of their post-partum period (Riera, 1982; Torres-Acosta *et al*., 1996; Greyling, 2000; Omer, 2003). Factors influencing post-partum period could include age, prolificacy, suckling, nutrition, season and periparturient disorders (Williamson and Payne, 1987; Elsheikh and Yagoub, 2006).

Goats in temperate zones are seasonal breeders and photoperiod plays an important role in their reproductive activity (Noakes *et al*., 2001). Parturition in these animals is usually, followed by a period of anoestrus and return to oestrus, within the same season could only happen in animals giving birth early during the season or in those with longer-than normal breeding season (Williamson and Payne, 1987). In tropical countries, where no significant difference in photoperiod exists between the seasons, local breeds give birth any time throughout the year (Williamson and Payne, 1987).

After parturition the uterus is exposed to bacterial contamination. During the first 7 weeks post-partum 33 different species of bacteria could be isolated from uterus of cows (Johanns *et al*., 1967; Elliott *et al*., 1968; Griffin *et al*., 1974). In contrast very few organisms were found in uteri of normal post-partal ewes (Noakes *et al*., 2001). Nevertheless, bacteria could be isolated from 90% of ewes subjected to induced death of embryos (Sawyer, 1977). Reports on isolation of bacteria from uteri of normal parturient goats are lacking, but they are assumed to resemble ewes (Sharma *et al*., 1998; Noakes *et al*., 2001). The objective of this study is to investigate the effect of caesarian section on the aerobic uterine flora and on the length of the post-partum period in Nubian goats in the Sudan.

MATERIALS AND METHODS

Location: This experiment was conducted in the Sudan University, Khartoum North, at a latitude of 15° 37′ N, longitude 32° 32′ E and 376 metres above sea level.

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Animals: Ten Nubian goats at their late stage of pregnancy were allotted to this experiment. They were between 3 to 4 years old, body weigh between 40 to 50 kg and parity between 2-3 kiddings.

Husbandry and management: The animals were housed in an open-side shed. The roof was 3.0 metres high constructed with corrugated iron sheets, located in Sudan University Farm. The animals were fed on a concentrate ration offered once daily, green alfalfa and water given *ad-libitum* the animals were allowed to exercise and graze once a week in an adjacent field of green alfalfa and sorghum grass (Abu 70). Endo-parasites were controlled by monthly injection of Ivermectin (1mg/50kg 1/m, Ivotek, Star Laboratories PVT, Pakistan).

Experimental design: The animals were divided into two equal groups (5 animals each). These two groups were randomly assigned to two treatments.

Group (A): constituted the control group in which Nubian goat give birth normally without assistance.

Group (B): embraced the Nubian goats which were subjected to caesarian section (C.S. group).

Caesarean section: Caesarean section was performed, according to Noakes *et al.* (2001) through a left flank incision under paravertebral, inverted L-shaped nerve block or by local infiltration analgesia with the animal in right lateral recumbency.

Sample collection: A total of 82 deep cervical swabs comprising 38 deep cervical swabs from the control group and 44 swabs from the treatment group (C.S. group).

The swabs were taken starting from day 2 after parturition, then continued at intervals of 3-5 days till the last goat came into the first observable oestrus, when no isolates were recovered from the last samples.

Bacteriological procedures: The swabs were smeared directly on blood agar and McConkey agar and the isolates were identified according to Barrow and Feltham (1999).

Statistical analysis: Statistical Package for Social Science (SPSS. 10-05, Inc. 1999) was used for comparison of means.

RESULTS

Organisms isolated from total samples: A total of 104 isolates were recovered from the 82 deep cervical swabs which were collected from post-parturient Nubian goats.

Table 1: Frequency of isolation of uterine aerobic bacteria from post-parturient normally kidded and C. sectioned Nubian goats

No.	Bacteria isolated	Control group n (%)	C. sectioned group n (%)
1	*Bacillus cereus*	2 (4.76%)	1 (1.61%)
2	*Bacillus licheniformis*	1 (2.38%)	-
3	*Bacillus mycoides*	-	1 (1.61%)
4	*Bacillus pumilus*	1 (2.38%)	-
5	*Bordetella parapertussis*	-	1 (1.61%)
6	*Corynebacterium diphtheriae*	-	2 (3.23%)
7	*Corynebacterium pilusum*	-	1 (1.61%)
8	*Corynebacterium pseudodephthericum*	-	1 (1.61%)
9	*Corynebacterium pseudotuberculosis*	-	1 (1.61%)
10	*Escherichia coli*	13 (30.95%)	15(24.19%)
11	*Escherichia fergusonii*	1 (2.38%)	2 (3.23%)
12	*Gemella haemolysans*	2 (4.76%)	-
13	*Klebsiella oxytoca*	1 (2.38%)	-
14	*Micrococcus kristinae*	3 (7.14%)	-
15	*Micrococcus leutus*	-	1 (1.61%)
16	*Proteus mirabilis*	-	10(16.13%)
17	*Proteus penneri*	-	2 (3.23%)
18	*Staphylococcus carnosus*	-	1 (1.61%)
19	*Staphylococcus chromogens*	3 (7.14%)	16(25.81%)
20	*Staphylococcus klossii*	2 (4.76%)	-
21	*Staphylococcus lentus*	-	1 (1.61%)
22	*Staphylococcus saccharolytics*	2 (4.76%)	-
23	*Staphylococcus saprophyticus*	2 (4.76%)	-
24	*Staphylococcus schleiferi*	1 (2.38%)	-
25	*Staphylococcus sciuri*	1 (2.38%)	-
26	*Staphylococcus simulan*	1 (2.38%)	-
27	*Streptococcus faecalis*	6 (14.29%)	4 (6.45%)
28	*Streptococcus pneumonae*	-	1 (1.61%)
29	*Streptococcus uberis*	-	1 (1.61%)
29	Total	42 (100%)	62 (100%)

n = Number, - = No isolation

The isolates belonged to 10 different genera including *Bacillus* sp. *Bordetella* sp. *Corynebacterium* sp. *Escherichia* sp. *Gemella* sp. *Klebsiella* sp. *Micrococcus* sp. *Proteus* sp. *Staphylococcus* sp. and *Streptococcus* sp.

Organisms isolated from the control group: Fourty two isolates were recovered from 38 cervical swabs collected from the control group. Sixteen organisms form seven genera were isolated, including *Bacillus* sp. *Escherichia* sp. *Gemella* sp. *Klebsiella sp. Micrococcus* sp. *Staphylococcus* sp. and *Streptococcus* sp. The distribution and frequency of the isolates are shown in Table 1.

Organisms isolated from the C.S group: Sixty two isolates were recovered from 44 cervical swabs collected from the C.S group. Eighteen organisms form eight genera were isolated, including: *Bacillus* sp. *Bordetella* sp. *Corynebacterium* sp. *Escherichia* sp. *Micrococcus* sp. *Proteus* sp. *Staphylococcus* sp. and *Streptococcus* sp. The distribution and frequency of the isolates are shown in Table 1.

Table 2: Organisms isolated from post-partal normally kidded Nubian goats (control)

Goats	Days post-partum								
No.	2	6	9	13	16	21	26	31	36
1	*Sterp. faecalis*	*Staph.sciuri* *E. coli* *B. cereus*	*E. coli*	*E. coli*	*E. coli*	*E. coli* *Strep.faecalis*	*E. coli*	*Staph. simulan* *Micro.kristinae*	**
2	*E. fergusonii* *B. pumilus*	*Sterp. faecalis* *E. coli*	*E. coli*	*	*	*Staph.klossii*	*Kleb.oxytoca*	*Staph. chromogens*	*Staph. chromogens*
3	*B. cereus*	*E. coli*	*E. coli*	*E. coli*	*E. coli*	*	*Micro.kristinae*	*Staph. saccharolytics*	
4	*E. coli*	*B. licheniformis*	*Staph saproph - yticus*	*Micro kristinae*	*Staph klossii*	*Staph.sapro -phyticus*	*		
5	*Sterp. faecalis*	*Sterp faecalis*	*Gemella haemolysans*	*Gemella haemolysans*	*Staph chrom -ogens Strep faecalis*	*Staph saccharolytics* *Staph. schleiferi*	*		

** No isolates, ** Signs of oestrus.

Table 3: Organisms isolated from post-partal C. sectioned Nubian goat (C. S. grouop)

Goats	Days post-partum									
No.	2	6	9	13	16	21	26	31	36	41
1	*E. coli* *B.mycoides*	*Staph chromogens* *Strep.uberis*	*E. coli*	*Staph. lentus*	*E. coli* *Proteus mirabilis*	*E.coli* *Proteus mirabilis*	*chromogens* *Strep.faecalis*	*Staph carnosus* *Strep.faecalis*	*Staph chromogens*	*Staph.* **
2	*E. coli* *Bordetella parapertussis*	*Proteus mirabilis*	*Proteus mirabilis*	*Staph. chromogens*	*E.coli* *Proteus mirabilis*	*E.fergusonii* *Proteus mirabilis*	*E.coli*	*E.coli* *Proteus mirabilis*	**	
3	*E.coli* *Proteus mirabilis*	*Proteus mirabilis*	*E.coli* *Proteus mirabilis*	*E.coli* *Proteus penneri*	*Proteus penneri*	*Staph. chromogens*	*Staph. chromogens*	*Staph. chromogens*	*Staph.chromogens* *Coryn .pseudotuber -culosis*	**
4	*E.coli*	*Ecoli*	*E.Fergu-sonii*	*E. coli* *B.cereus* *Staph. chromogens*	*Staph. chromogens*	*Staph. chromogens*	*Staph. chromogens* *Strep.Pneumonae* *Coryne. diphtheriae*	*Staph. chromogens* *Coryne. pilosum*	*Staph. chromogens* *Strep. faecalis*	**
5	*Coryne. pseudo-diphtherticum*	*Staph. chromogens*	*E. coli*	*	*Micro leutus*	*	*Staph. chromogens* *Strep.faecalis*	*Staph. chromogens* *Coryne. diphtheriae*		

** No isolates, ** Signs of oestrus

From Table 1 it is shown that only five organisms were common between the two groups and those isolates include: *Bacillus cereus, Escherichia coli, Escherichia fergusonii, Staphylococcus chromogens* and *Streptococcus faecalis*. Also it is shown that the genera isolated from the control group alone included: *Gemella* sp. and *Klebsiella* sp. and those isolated from the C.S group included: *Bordetella* sp. *Corynebacterium* sp. and *Proteus* sp. and most of *Staphylococcus chromogens* isolations were recovered from the C.S group (25.8% from C.S and 7.14% from the control group).

The length of post-partum period in the two groups: Determination of post-partum period was based on samples free of organisms and / or appearance of first observable post-partum oestrus (Table 2 and 3). Normally kidded Nubian goats recorded post-partum periods ranging between 13-36 days (23.4±8.46). However, the post-partum period in the C.sectioned Nubian goats ranged between 21-41days (35±8.22). The difference between the post-partum periods in caesarean sectioned and normally kidded Nubian goats was significant ($p<0.05$).

DISCUSSION

In this study 29 species of aerobic bacteria were isolated from deep cervical swabs taken during the post-partal period from normal kidded and C. sectioned Nubian goats. This finding is similar to those reported in post-parturient cows (Elliott *et al*., 1968; Griffin *et al*., 1974; Ibrahim, 2000). Species of bacteria isolated were close to those found in cows except for Proteus sp. Normal Parturient ewes are shown to be less prone to bacterial contamination (Noakes *et al*., 2001). The effect of C. S. was evident on the nature and frequency of bacteria isolated from Nubian goats.

Corynaebacteria and Proteus sp. were only found in the C. sectioned group and most of Staphylococcus chromogens (25.8%) were also isolated from these animals. This result is consistent with those reported in cows, sheep and goats with parturient problems (Griffin *et al*., 1974). The qualitative fluctuation of bacteria isolated, during the course of this study, in both groups, could be attributed to spontaneous clearance and recontamination as previously reported in cows by

Elliott *et al.* (1968) and Griffin *et al.* (1974). Return to oestrus and dominance of oestrogen is largely responsible for clearance of uterine bacterial flora and this could explain the absence of isolates in swabs taken during silent or observable heat (Noakes *et al.*, 2001). Thus, bacteriological methods could also provide an additional aid for oestrous detection and post-partum oestrus as short as 13 days could be monitored as observed in the control group. The average post-partum period in normally kidded goats were significantly shorter compared to C. sectioned group. The results of both groups were less than those reported in Nubian goats in the Sudan (Omer, 2003; Elsheikh and Yagoub, 2006) and in Boer goats (Greyling, 2000). However post-partum period in the control group agreed with those reported in Creole goats (Chemineau, 1983). Prolongation of the post-partum period in the C. sectioned group could be attributed to uterine trauma and the associated change in the nature of bacterial flora (Noakes *et al.*, 2001) but since these goats were not dystocic and they received good care before and after the surgical procedures they recovered within the expected limits for normally kidded animals (Noakes *et al.*, 2001).

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