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Systemic Dexamethasone and its Effect on Normal Aerobic Bacterial Flora of Cow

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Abstract: This study was carried out on 17 Holestein, heifers, aged between 1 to 2 years for determining the normal aerobic bacterial flora and their changes after dexamethasone injection. Swab samples were taken from eye, ear, pharynx and vagina before and 5 days after twice dexamethasone treatment. Results indicated that *Bacillus cereus* and *Corynebacterium pseudotuberculosis* had higher frequency of isolations than the other bacterial flora in eye, ear and pharynx. *Actinomyces pyogenes* was isolated with considerable frequency from vagina. *Klebsiella pneumoniae* was also isolated from pharynx and its frequency was increased significantly after dexamethasone injection ($p<0.05$).

Key words: Corticosteroids, heifers, microbial flora

INTRODUCTION

All animals have normal flora that live on or upon the body surfaces without producing any disease. In various climates and geographic locations and even in each individual, the composition of normal flora is variable. Suppression of the normal microflora may lead to bacterial or fungal infections Carter and Chengappa (1991).

Ermis *et al.* (2004) explained that topically applied dexamethasone did not cause a significant change in colony counts of the healthy human conjunctiva. Gemensky-Metzler *et al.* (2005) show changes in bacterial and fungal ocular flora of clinically normal horses following experimental application of topical antimicrobial-corticosteroid ophthalmic preparations.

Hoffmann-Jagielska *et al.* (2003) studied the effect of dexamethasone on cat immunological system. Goff (1996) used dairy cows that naturally infected with bovine tuberculosis and evaluated their blood gamma interferon before and after treatment with dexamethasone. He suggested that dexamethasone could reduce value of gamma interferon against *M. tuberculosis* (PPD).

Reports of the effects of systemic dexamethasone therapy on cow surface bacterial flora are scarcely rare. In view of the frequent use of dexamethasone in the treatment of cows, we studied the effect of systemic dexamethasone treatment on their common normal bacterial flora of eye, ear, pharynx and vagina and find its probable differences after dexamethasone injection.

MATERIALS AND METHODS

The study was design in mid 2005 to determine the normal aerobic bacteria flora and their changes after dexamethasone injection on 17, 1-2 year old Holestein heifers, in faculty dairy farm. Swab samples were taken from eye, ear, pharynx and vagina aseptically from clinically normal heifers. Dexamethasone sodium phosphate was injected twice (0.04 mg kg^{-1} B.W. I.M.) at one-day interval and second samples were taken 5 days after the last injection.

Swab samples were carried in tubes containing 3-5 mL TSB (Tryptose Soy Broth) to Microbiology Laborateny of Veterinary College as soon and placed in 37 degree centigrade incubator for 18-24 h.

The samples followed by routine procedures for culture and identification of aerobic bacteria. Briefly 0.1 mL^{-1} aliquots of all tubes were plated on MaConkey agar and Blood agar and incubated at 37°C for 24 h.

Appeared bacterial colonies were followed by standard microscopical and biochemical tests for isolation and final identification (Quinn *et al.*, 2002).

The results were analysed using chi-squared test at the level of $p<0.05$.

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RESULTS

From the eye samples *Bacillus cereus* 7 (38.9%), *Corynebacterium psudotuberclusis* 7 (38.9%), *Bacillus mycoides* 3 (16.7%) and *Staphylococcus epidermis* 1 strains were isolated and identified before dexamethazone treatment while after treatment the numbers were 8 (42.1%), 5 (26.32%), 5 (26.32%) and 1 (5.26%), respectively Table 1. Changes in the number of isolations were not statistically significant ($p<0.05$). Samples are shown in Table 2-4.

From ear samples (Table 2) the frequency of *Bacillus cereus* were significantly increased after injection ($p<0.05$).

As shown in Table 3 the frequency of *Bacillus cereus* was significantly increased after injection ($p<0.05$).

Among the isolated bacteria from the body surfaces only the changes in the numbers of *Klebsiella pneumonia* before and after dexamethasone treatment were statistically significant ($p<0.05$) (Table 4).

Table 1: Frequency and relative frequency of isolated bacteria from eye, before and after twice injection of dexamethasone (0.04 mg kg^{-1} B.W. I.M)

	Before injection		After injection	
Bacteria	Cases	%	Cases	%
Bacillus cereus	7	38.90	8	42.10
Corynebacterium pseudotuberculosis	7	38.90	5	26.32
Bacillus mycoides	3	16.70	5	26.32
Staphylococcus epidermidis	1	5.50	1	5.26
Total	18	100.00	19	100.00

Table 2: Frequency and relative frequency of isolated bacteria from ear, before and after twice injection of dexamethasone (0.04 mg kg^{-1} B.W. I.M)

	Before injection		After injection	
Bacteria	Cases	%	Cases	%
Bacillus cereus	5	20.83	6	28.58
Corynebacterium pseudotuberculosis	6	25.00	5	23.80
Staphylococcus epidermidis	7	29.17	5	23.80
Bacillus mycoides	3	12.50	3	14.29
Proteus mirabilis	3	12.50	2	9.53
Total	24	100.00	21	100.00

Table 3: Frequency and relative frequency of isolated bacteria from pharynx, before and after twice injection of dexamethasone (0.04 mg kg^{-1} B.W. I.M)

	Before injection		After injection	
Bacteria	Cases	%	Cases	%
Corynebacterium pseudotuberculosis	12	41.38	11	32.35
Bacillus cereus	5	17.24	4	11.77
Klebsiella pneumoniae	3	10.34	11	32.35
Bacillus mycoides	4	13.79	4	11.77
Pseudomonas aeruginosa	2	6.90	2	5.88
Staphylococcus epidermidis	2	6.90	1	2.94
Enterobacter aerogenes	1	3.45	1	2.94
Total	29	100.00	34	100.00

Table 4: Frequency and cumulative frequency of isolated bacteria from vagina, before and after twice injection of dexamethasone (0.04 mg kg^{-1} B.W. I.M)

	Before injection		After injection	
Bacteria	Cases	%	Cases	%
Bacteroides fragilis	4	16.67	3	12.50
Propionibacterium spp.	0	0.00	1	4.17
Actinomyces pyogenes	15	62.50	14	58.33
Proteus mirabilis	3	12.50	5	20.83
Staphylococcus saprophyticus	2	8.33	1	4.17
Total	24	100.00	24	100.00

DISCUSSION

In the current study the effect of dexamethasone as an immunosuppressive agent on surface bacterial flora was considered. Although some apparent changes in the frequency of isolated bacteria was observed but those changes were not statistically significant except for *Klebsiella pneumoniae* that significantly increased in pharynx after dexamethasone injection ($p<0.05$).

Klebsiella can exist as either saprophytes or parasites in nature and this microorganism was expected to occur normally in large intestine. *Klebsiella* strains have been recovered from various animal infections (Carter and Chengappa, 1991). Ermis *et al.* (2004) reported that dexamethasone had no significant effect on human ocular microbial flora but Gemensky-Metzler *et al.* (2005) has reported that corticosteroid application can decrease the number of eye bacterial flora of horse. However we could not find reports on survey of cow's normal surface microbial flora.

As our results indicated *Bacillus cereus* and *Corynebacterium pseudotuberculosis* had higher frequency of isolations than the other bacterial flora in eye, ear and pharynx. *Actinomyces pyogenes* was isolated with considerable frequency from vagina.

Cattle seams to be much more susceptible to the immunosuppressive effects of dexamethasone than swine (Roth and Flaming, 1990).

Roth and Kaeberle (1985) use dexamethasone injected at 0.04 mg kg^{-1} daily for 3 days as an immunosuppression model in cattle.

It seems that further surveys should be carried to determine cow's aerobic and anaerobic bacterial flora and then investigate its changes in different trials. Based on our preliminary results we may conclude that dexamethasone treatments have not significant effects at least on aerobic surface bacterial flora of cows.

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