

Local and Systemic Immunomodulatory Effect of Exogenous Prostaglandin administered in Normal and Abnormal Parturient Cows

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ABSTRACT

The present investigation undertaken to study the immune status that is both uterine and systemic of post-partum cows upon consequent to prostaglandin treatment in normal and abnormal parturition. The level of total immunoglobulin simultaneously both in serum and uterine luminal fluid at various intervals of involution period consequent to prostaglandin treatment in normal and abnormal parturition are quantified.

Key words: Prostaglandin, immunoglobulin, uterus

INTRODUCTION

Uterine infections can be both local and systematic can result in making the uterine environment hostile that in turn affects the sperm transport, transport of ova thus directly affecting the reproductive status of animal. Estimating the local and systemic immunity status can give us a fair idea about the reproductive performance of animal¹. The present study describes the effect of exogenous administration of prostaglandin F₂α on both the serum and uterine immunoglobulin status.

MATERIALS AND METHODS

Twenty one (21 No.) post parturient cows were selected, out of which, fourteen (14 No.) had history of abnormal parturition (Puerperal complications like dystocia and retained fetal membrane were considered as abnormal parturition) and rest gave birth to a healthy fetus normally without any complications and assistance. The abnormal parturient cows were grouped into two taking equal number of animals (seven) in each.

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Group I: (n = 7) Normal post-partum cows that were not given any such treatment were considered as a control.

Group II: (n = 7) Abnormal parturient cows were not subjected to prostaglandin treatment; instead they were routinely treated with Tetracycline

Group III: (n = 7) the cows with history of abnormal parturition were given 2 ml. of Clostenol (Cloprostenol 250µgm, ProstaglandinF₂α) intramuscularly on zero, seventh and fourteenth day post-partum.

15 ml blood was collected aseptically by jugular vein puncture without minimum possible disturbance during restrain and aliquot was made in test tube and the serum was harvested with sterile pipette by aspiration and stored in sterile vial at -20°C. Uterine samples were collected as described by Stiffen *et al.*². Uterine discharge was collected from all the experimental cows in consistent with the blood sampling. The aspirated uterine content was transferred into a sterile glass vials aseptically and stored at -20°C for uterine immunoglobulin assay. The total immunoglobulin concentration of blood Serum and uterine samples collected from all the experimental animals were processed for immunoglobulin as per the method McEwan *et al.*³ with a slight modification.

The serum immunoglobulin (Ig) concentrations in normal parturient animals were given in **Table 1**. The analysis of variance did not record any significant difference between days within group and between groups within days with respect to various combinations (**Table 2**). The immunoglobulin concentration of blood serum ranged from 1.8 to 3.2 gm/dl⁴. Erhard *et al.*⁵ estimated the Ig profile in Post parturient animals and indicated an ascending trend (13.8 to 21.6) within 24 h of parturition to day 40 postpartum. However many authors like Guidry *et al.*⁶ and Gujar *et al.*⁷ showed a decreasing trend of Ig profile immediately after parturition and with the advancement of postpartum period it increases to the normal level. The initial decrease in immunoglobulin concentration in serum is due to its influx into mammary gland and uterus at initial stage of parturition⁸. However in the later stages, the normal Ig profile is restored as a result of initiation of ovarian cyclicity. The immunoglobulin values (mg/ml) in uterine luminal fluid in different groups of animals are mentioned in **Table 3**. Analysis of variance conducted between days within group showed a significant variation (P< 0.05) for group III animals where prostaglandinF₂α was administered. However, no significant difference could be observed either for group I or II for the same interaction.

RESULTS AND DISCUSSION

Table 1: Serum immunoglobulin (mg/ml) on various days) postpartum in experimental groups

| Days Group | Postpartum days | | |
|--------------------|-----------------|------------------|------------------|
| | 7 th | 14 th | 21 st |
| Group I (n=7) | 17.08±2.16 | 18.01±2.54 | 20.07±2.67 |
| Group II (n=7) | 13.88±1.42 | 14.65±1.38 | 18.13±1.89 |
| Group III (n=7) | 15.64±2.81 | 17.07±1.33 | 19.35±1.29 |

Table 2: Analysis of variance of Serum immunoglobulin (mg/ml) on various days postpartum in experimental groups

| d.f. | Between days within group | | | | | | Between group within days | | | | | |
|------|---------------------------|--------------------|----------------|--------------------|-----------------|--------------------|---------------------------|--------------------|----------------------|--------------------|----------------------|--------------------|
| | Group I (n=7) | | Group II (n=7) | | Group III (n=7) | | Day 7 th | | Day 14 th | | Day 21 st | |
| | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' |
| 2 | 16.34 | 0.38 ^{NS} | 35.75 | 2.04 ^{NS} | 24.49 | 0.92 ^{NS} | 17.98 | 0.53 ^{NS} | 20.98 | 0.88 ^{NS} | 6.75 | 0.23 ^{NS} |
| 18 | 42.64 | | 17.51 | | 26.45 | | 34.09 | | 23.70 | | 28.81 | |

NS: Not significant

Table 3: Uterine immunoglobulin (mg/ml) on various days postpartum in experimental groups

| Days Group | Postpartum days | | |
|-----------------|-----------------|------------------|------------------|
| | 7 th | 14 th | 21 st |
| Group I (n=7) | 1.37±0.20 | 1.08±0.10 | 0.88±0.07 |
| Group II (n=7) | 1.72±0.28 | 1.47±0.20 | 1.23±0.17 |
| Group III (n=7) | 1.44±0.12 | 1.18±0.14 | 0.91±0.07 |

Table 4: Analysis of variance of uterine immunoglobulin (mg/ml) between different days post partum in experimental groups

| d.f. | Between days within group | | | | | | Between group within days | | | | | |
|------|---------------------------|------|----------------|------|-----------------|------|---------------------------|------|----------------------|------|----------------------|------|
| | Group I (n=7) | | Group II (n=7) | | Group III (n=7) | | Day 7 th | | Day 14 th | | Day 21 st | |
| | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' | Mean Squares | 'F' |
| 2 | 0.42 | 3.15 | 0.44 | 1.26 | 0.49 | 5.29 | 0.25 | 0.80 | 0.28 | 1.69 | 0.25 | 2.66 |
| 18 | 0.13 | NS | 0.35 | NS | 0.09 | * | 0.31 | NS | 0.17 | NS | 0.09 | NS |

NS: Not significant * P<0.05

The uterine Ig profile showed a reverse trend with highest value on day 7 registering a value (mg/ml) for normal, abnormal and PG treated abnormal parturient cows (**Table 3**). Similarly, the lowest value was marked in all the experimental groups on 21st day sampling. Analysis of variance revealed a significant difference (P<0.05) between days in PGF2α treated group on the other hand no such variation could be observed for rest of the combinations (**Table 4**). Various authors have estimated the total Ig value in of different

stages of estrous cycle and during uterine infection. Ahmed *et al.*⁹ obtained significantly higher IgG of 61.06±4.89 mg/dl during estrous compared to luteal phase with respect to uterine sample. Manjunatha *et al.*¹⁰ obtained slightly lower value compared to present observation and this might be due to collection of uterine fluid following flushing. The decreasing trend in uterine Ig concentration validates the report of various workers. Pramod *et al.*¹¹ concluded that the requirement of local immune response is not actively

needed as a result of recovery from uterine infection. More over local immune response needed following parturition comes to a moderate level with elimination of infection. In prostaglandin treated group, the significant decrease in Ig concentration on 21st day might be due to potent uterotonic effect of prostaglandin substantiated with local cellular and humoral immunity. Therefore, it may be presumed that PG may not have the ability to elicit the systemic immune response but none the less, it produces significantly higher response of immunopotence in uterine environment.

CONCLUSION

The present study describes the effect of administration of prostaglandin F₂α on both the serum and uterine immunoglobulin status.

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