EFFECT OF INSULIN ADMINISTRATION DURING LUTEAL PHASE ON PROGESTERONE PROFILE AND CONCEPTION RATE IN BUFFALOES *(BUBALUS BUBALIS)**

Q.I.HUQ[1], H.P.GUPTA[2], SHIV PRASAD[3] AND A.K.GUPTA[4]

Department of Veterinary Gynaecology & Obstetrics
College of Veterinary and Animal Sciences
Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, 263-145

Received : 11.04.2011 Accepted : 29.03.2014

ABSTRACT

The present study was conducted to test the effect of insulin administration (Human Mixtard®, S/C @ 0.25 IU/kg body weight) during luteal phase on serum progesterone profile and conception rate in buffaloes. Estrus was induced using 2ml (263µg/ml) cloprostenol sodium (im). Buffaloes were bred naturally during estrus. Insulin was injected on day 10 of estrous cycle in treatment group (n=10), while PBS was given s/c to the control group (n=10) on same day. The conception rate was higher in the treatment group (70%) than the control group (50%). The serum progesterone concentration remained higher from day 12 to 30 in the treatment group than the control group and in pregnant than non-pregnant animals. Thus, it may be concluded that the insulin administration during luteal phase had beneficial effect on the serum progesterone concentration and conception rate.

Key words: Buffalo, Insulin, Progesterone, Conception rate.

INTRODUCTION

Luteal insufficiency is one of the important factors resulting into pregnancy losses in the bovines (Santos *et al.*, 2004). Only 60 % of the formed embryos are converted into live calves as against fertilization rate of 88-90% in the bovines (De Los Santos-Valadez *et al.*, 1982). Insulin, insulin like growth factor-I (IGF-I) and growth hormone have been proposed as metabolic mediators affecting reproductive functions (Lacky *et al.*, 2000). Therefore, the present investigation was undertaken to study the effect of insulin administration during luteal phase on progesterone profile and conception rate in buffaloes.

MATERIALS AND METHODS

The experimental animals comprised of normal cyclic buffaloes (n=20) with apparently normal genitalia. They were divided into treatment (n=10) and control (n=10) groups. The experimental animals (having mature corpus luteum) were induced to oestrus by injecting 2ml (263µg/ml) cloprostenol sodium (im). The buffaloes were bred by natural service at the detected estrus.

The insulin (Human Mixtard®, Torrent pharmaceuticals Ltd., India) was given s/c @ 0.25 IU/kg body weight to the treatment group on day 10 of the estrous cycle and PBS was given to the control group. Blood samples were taken by jugular venipuncture on day 0, 12, 14, 18 and 30 in both the groups. The blood serum was separated and stored at -20°C till analysis. The serum progesterone was estimated by radio immune assay using RIA kits (Immunotech, France). Pregnancy diagnosis was conducted after the 60 days of breeding by per rectal examination. The data so generated were analyzed statistically and subjected to the test of significance (Snedecor and Cochran, 1994).

*Part of MVSc thesis submitted by first author to G. B. Pant University of Agriculture and Technology, Pantnagar, 263-145; [1]VO, J & K. Govt.
[2]Professor and Head (corresponding author);
[3]Professor; 4VO, UP Govt.

RESULTS AND DISCUSSION

The results have been shown in the Table 1 and 2. The higher conception rate of 70% was recorded in the treatment group as compared to the control group (50%). However the difference was not significant. The present finding is in accordance with Lalthazuali *et al.* (2010) and Kharche *et al.* (2003) who also recorded higher conception rate in buffaloes treated s/c with multiple injections of insulin. However, Kharche *et al.* (2003) did not observe beneficial effect of the single injection of insulin.

In the present study, the serum progesterone concentration remained higher from day 12 to 30 in the treatment group, as compared to control group irrespective of pregnancy status of the animals (Table 1). However, the differences were not significant. Comparison of data on progesterone profile between pregnant and non pregnant animals of the treatment group (Table 2) revealed the higher level of the progesterone in the pregnant animals from day 12-30. But, the difference was significant only on day 18 ($P<0.05$). The significant difference on day 18 might be due to effect of luteolysis (Ahmad, 2001).

Higher progesterone concentration in the treated animals along with higher conception rate observed in the present investigation is well conceivable. In ruminants, interferon tau (IFN – τ) is known to be essential for maintenance of pregnancy, which in all polyestrous animals with spontaneous ovulation requires the persistence of the cyclic corpus luteum. The IFN – τ is secreted from the trophectoderm of the viable conceptus prior to implantation between day 10 and 21-24. It is thought to inhibit secretion of $PGF_{2\acute{a}}$ from the endometrium (Schafer-Soni, 2003) and suppress regression of corpus luteum. Daliri *et al.* (1999) reported that the presence of insulin receptors within the embryo and oviductal cells indicate that the embryonic development is supported by both autocrine and paracrine action of insulin. The insulin may also enhance the embryo development through action on uterus, as suggested by Thatcher *et al.* (1995) that lower insulin concentration may reduce uterine amino acids and glucose uptake, and secretion of histotrophs, which could restrict conceptus development and its ability to secrete IFN – τ. Increasing peripheral progesterone between days 5 and 15 of estrous cycle may enhance embryo development and suppress luteolysis, ultimately resulting in higher conception rate (Mann *et al.*, 1999).

Table 1: Mean concentration of serum progesterone in animals (pregnant + non-pregnant) of control and treatment group

S.No.	Days of sampling	Mean ± SE of Progesterone profile (ng/ml)		t-Value
		PBS on day 10 (Control, n=10)	Insulin @ 0.25 I.U./kg body weight on day 10 (Treatment, n=10)	
1	Day-0	0.296±0.048	0.282±0.035	0.224
2	Day-12	4.220±0.324	5.060±0.491	-1.470
3	Day-14	4.580±0.249	4.911±0.692	-0.520
4	Day-18	2.904±0.681	4.125±0.723	-0.85
5	Day -30	3.471±0.420	3.926±0.543	-0.65

Table 2: Mean concentration of serum progesterone in pregnant and non-pregnant animals of treatment group

S.No.	Days of sampling	Mean ±SE of Progesterone profile (ng/ml)		t-Value
		Insulin @ 0.25 I.U./kg body weight on day 10 (Pregnant, n=07)	Insulin @ 0.25 I.U./kg body weight on day 10 (Non-pregnant, n=03)	
1	Day-0	0.247±0.022	0.366±0.066	-2.145
2	Day-12	5.587±0.506	3.833±0.865	1.822
3	Day-14	4.985±0.964	4.477±0.919	0.127
4	Day-18	4.865±0.651*	1.126±0.119	-3.642
5	Day -30	4.421±0.088	2.743±0.749	1.434

*Significant at 5% level of significance

ACKNOWLEDGEMENT

Financial support from the National Fund for Basic and Strategic Research in Agriculture (NFBSRA), ICAR, New Delhi under the project entitled "Antiluteolytic strategies - A novel approach to enhance fertility in buffalo" is thankfully acknowledged.

REFERENCES

Ahmad, N. (2001). Reproduction in buffaloes. In: Noakes, D.E., Parkinson, T.J. and England, G.C.W. *Arthur's Veterinary Reproduction and Obstetrics.* 8th edn. Harcourt Publishers limited, New Delhi, India, pp. 789-799.

Daliri, M. Appa Rao, K.B.C., Kaur, G., Patil, S. and Totey, S.M. (1999). Expression of growth factor legend and receptor genes in preimplantation stage water buffalo (Bubalus bubalis) embryos and oviduct epithelial cells. *J. Reprod. Fert.*, **177**: 61-70.

De Los Santos–Valadez S., Seidel, G.E. and Elsden, R.P. (1982). Effect of hCG on pregnancy rate in embryo transfer recipient. *Theriogenology,* **17**: 85-93

Kharche, S.D., Majumdar, A.C and Srivastava, S.K. (2003). Influence of exogenous insulin on conception rate in crossbred cattle. *Indian J. Anim. Sci.,* **73**(8): 890-91.

Lacky, B.R., Gray, S.L.L. and Henricks, D.M. (2000).Physiological basis for use of insulin like growth factors in reproductive applications: A review. *Theriogenology,* **53**:1147-1156

Lalthazuali, Singh, J., Ghuman, S.P.S., Pandey, A.K. and Dhaliwal, G.S. (2010). Impact of insulin treatment during post-insemination mid-luteal phase on luteal profile and conception rate in buffalo. *Indian J. Anim. Sci.,* **80** (9): 854-856

Mann, G.E., Lamming, G.E., Robinson, R. and Wathes, D. (1999).The regulation of interferon-tau production and uterine hormone receptors during early pregnancy. *J. Reprod. Fert.,* **54**: 317-28

Santos, J.E.P., Thatcher, W.W., Chebel, R.C., Cerri, R.L.A. and Galvao, K.N. (2004). The effect of embryonic death rates in cattle on the efficacy of oestrous synchronization programs. *Anim. Reprod. Sci.,* **82**: 513-35.

Schäfer-Somi, S. (2003). Cytokines during early pregnancy of mammals: a review.*Anim. Reprod. Sci.,* **75**: 73–94

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods, 8th Edn. Ames, Iowa State University Press. 503p.

Thatcher, W.W., Meyer, M.D and Danet-Desnoyers, G. (1995). Maternal recognition of pregnancy. *J. Reprod. Fert.,* **49**: 15-28.