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*In vitro* methods for production of buffalo embryos using procedures such as *in vitro* oocyte maturation, *in vitro* fertilization and *in vitro* development need to be developed since superovulation and embryo recovery have only limited success. The present study therefore aimed at production of buffalo embryos *in vitro*. In addition, the expression of mRNA transcripts encoding various growth factor ligands and receptors were studied including their role during oocyte development and embryo development using the sensitive RT-PCR technique.

The primer pairs for growth factor ligands and their receptors designed from murine or human cDNAs worked with the buffalo system showing that these growth factor genes were evolutionary conserved, even in buffalo. However, the expression of mRNA transcripts of these growth factors at various stages of preimplantation buffalo embryo, ovarian cells and oviductal cells were different from those of other species. Observations on growth factor transcripts, effects of exogenous growth factors and other factors influencing the cleavage and development rate of buffalo embryos are as follows:

1. Messenger RNA transcript for IGFs family, specially IGF-1 receptor and insulin receptor were found to be predominantly present in almost all the stages of preimplantation embryos, ovarian cells and oviductal cells suggesting that these growth factors play a fundamental role in embryogenesis. The expression of these growth factor transcripts were confirmed with appropriate restriction enzyme analysis.

2. Messenger RNA transcript for IGF-1 ligand was present only in granulosa cells and oviductal cells. It was not detected at any stage of embryos development.
3. Primer pair specific for IGF-I ligand amplified the bigger fragment, approximately 410 bp which was different in size (210 bp) from other species such as murine and bovine. Restriction digestion analysis of the IGF-I ligand with the appropriate enzyme Msp I, cut the PCR amplified product of IGF-I ligand indicating that there was a homology of buffalo IGF-I ligand with other species.

4. Primer pair specific for insulin receptor amplified an expected 324 bp PCR product, there was an another fragment of approximately 280 bp. Restriction digestion analysis for the insulin receptor with the appropriate enzyme Hinc II did not cut any of the two PCR products. Differential restriction digestion was done with Ban II, the appropriate enzyme for IGF-I receptor, assuming that the second product of insulin receptor was a cross reactive product of the IGF-I receptor. It did not, however, cut the 280 bp fragment. When the PCR product of the insulin receptor was digested with Msp I, it cut both the products indicating that the appropriate site was not available. therefore, the expression of mRNA in buffalo is different from other species.

5. mRNA transcripts for EGF, TGF-α and TGF-β2 were not detected at any of preimplantation embryo and ovarian cells. However, mRNA transcript for TGF-α was detected in oviductal cells only.

6. Addition of exogenous growth factors, insulin and IGF-I in CR1 aa medium during embryo development resulted in a significant increase in blastocyst development when compared to the control group. However, this effect was dose dependent.
7. Developmental rates based on early and late cleavage and their relationship to cell number was also studied. It was observed that fast cleaving embryos are more likely to develop into viable blastocysts with a large number of cells than slow cleaving embryos. The correlation between fast developing embryos and a particular sex was not observed in this study.