

EXOGENOUS ADMINISTRATION OF OXYTOCIN AND ITS RESIDUAL EFFECTS

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ABSTRACT

Oxytocin is a peptide hormone which is synthesized in the hypothalamic neurons and released from the posterior pituitary gland. This hormone has a wide range of applications in human and veterinary medicine. Whether secreted endogenously or administered exogenously, it produces the desired effects within minutes and is metabolized rapidly into inactive products. If at all oxytocin is secreted in the milk and is ingested alongwith milk, it is degraded by the gut enzymes and can not reach blood circulation in biologically active form. Thus, there seems to be no harm in consuming milk from oxytocin-treated dairy animals. However, its use in pregnant animals should be discouraged.

Key words: Oxytocin, exogenous, residual effects.

INTRODUCTION

Oxytocin is a nine amino acid peptide, synthesized in hypothalamic neurons and transported down the axons of the posterior pituitary gland. It is packaged into granules and secreted into blood along with carrier proteins called neurophysins. Oxytocin is also secreted within the brain and few other tissues, including the ovaries and testes.

Oxytocin is secreted endogenously in all mammals for induction and maintenance of labour as well as for initiation of milk letdown in the female. Since it is a peptide hormone, it disappears rapidly within two to six minutes from the blood stream due to the action of various enzymes. This paper describes the issue of residual effects of exogenous administration of this hormone in human and veterinary medicine.

Applications of oxytocin

The synthetic oxytocin is quite commonly used in human as well as veterinary medicine. In the human medicine, it is the drug of choice to induce rhythmic contractions of the uterus and augment uterine contractions during desultory labour. It is prescribed to control and prevent bleeding after childbirth and abortion. Oxytocin is also used for the induction of therapeutic abortion and management of inevitable or incomplete abortion. Equally important is its clinical use for promotion of milk ejection in lactating women, who experience difficulty in breast feeding and for treating cases of breast engorgement and mastitis.

In veterinary practice, oxytocin is used universally to induce letdown of milk and expulsion of retained placenta after delivery. The hormone is also used to aid delivery in young animals when the female has been in

labour for an extended period. Moreover, it is also helpful in the management of post parturient uterine prolapse. It is also employed frequently as an adjunct to antibiotic therapy for the treatment of mastitis in dairy animals.

Residual effects

The reports on the harmful effects of milk produced by oxytocin treated dairy cattle seem to be misleading. Whether secreted endogenously in response to natural stimuli or administered exogenously, oxytocin produces the desired effects within minutes and gets metabolized rapidly, leading to inactive products. Till date, there is not a single report which demonstrates the presence of this hormone in the milk. Those who imagine that it may escape the action of degrading enzymes and seep into milk in traces should also realize that in such a situation, all the breast-fed infants and newly born calves must be constantly exposed to these traces of oxytocin in mother's milk all the time without facing any health hazards whatsoever. The reason is that if at all ingested orally along with milk, oxytocin is bound to be digested like other proteins and peptides due to action of gut enzymes and gastric acids and cannot be absorbed from the intestine to reach the blood circulation again in the intact form.

According to Nostrand *et al.* (1991), the administration of oxytocin at a dose as high as 20 IU, twice daily (once at each milking), not only increases the milk yield substantially but also maintains greater persistency during lactation without changing the composition of milk. The daily administration of oxytocin for 305 days apparently had no effect on the health of the treated cows, particularly on the length of the estrous cycle. So far as the dairy owners restrict the use of exogenous oxytocin to the recommended dose

(1-3 IU per milking) for the complete recovery of milk already produced and available in the mammary glands, there should be no reason for any alarm whatsoever. Ballou *et al.* (1993) studied the effects of daily oxytocin injections before and after milking on milk production, milk plasmin and milk composition. These workers reported that oxytocin injections before and after milking significantly increased milk production by 3% and its effect on milk plasma activity, fat, protein, somatic cell count and lactose was non significant. Another study carried out at the Dairy Cattle Physiology Division of the National Dairy Research Institute (NDRI), Karnal, Haryana, India (Bansode *et al.*, 1996) also supports the above findings. According to NDRI scientists, the perception that the use of oxytocin for milk letdown in pregnant animals may cause abortion is also unscientific, since oxytocin receptors remain absent throughout pregnancy and appear only towards the end of the gestation period.

Thus, it appears that there is no question of milk produced by oxytocin treated dairy animals being harmful to those who consume it regularly. Firstly, due to its being unstable at room temperature, traces of oxytocin would be inactivated simply on storage and boiling of milk. Secondly, it would not escape the digestive system of the person who consumes it.

However, the drug should be available to the user only against the prescription of a registered medical/veterinary practitioner so that its indiscriminate use or misuse can be minimized.

On the basis of the scientific facts stated above, there does not seem to be any harm in using oxytocin in appropriate doses in dairy animals to facilitate increased milk letdown, particularly in a country like Pakistan where there is so much of a gap between demand and supply of milk. However, its use in pregnant animals should be discouraged.

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