Effect of low dose oxytocin treatment on the pregnancy rate of the dairy cows

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Abstract

It is well known that during the natural mating, stimulation of the female genital system by the bull causes oxytocin release from the caudal part of the female pituitary gland and this hormone enhances the sperm transport in the genital tract. During the artificial insemination (A.I), this hormone dose not release perfectly. For determine of the oxytocin effect on the pregnancy rates of the cows, a total 100 cows were chosen in a dairy herd located in a suburb of Tabriz (North-west of Iran). These cows were randomly divided into two groups. In the group A, during the A.I, 30 IU oxytocin (3cc Vetocin) was injected to the cows intramuscularly. In the group of B, 3cc saline was injected intramuscularly to the control cows. After 45 days of A.I, all of the cows were examined by rectal palpation for pregnancy detection. The pregnancy rates were 58% and 54% in the groups of oxytocin treated and control respectively. The difference between two groups did not differ significantly. These results indicated that oxytocin administration during the A.I had not significant effect on the cow's pregnancy rates.

Key words: Pregnancy Rate, Cows, Oxytocin, Sperm

Introduction

The rapid transport of live or dead sperm to the upper oviduct within a matter of minutes infers the importance of smooth muscle contractions in this situation. In the natural breeding, sperm are deposited during estrus at least 10 to 12 hours before ovulation, and the rate of sperm transport may be a critical factor for determining the conception rate. In the case of artificial insemination, particularly when this forms a part of an estrous synchronization and/or gonadotropin treatment program, the rate and efficiency of sperm transport to the site of fertilization are of fundamental importance (Hafez, 2000). Immediately after insemination, sperm penetrate the micelle of the cervical mucus where some are quickly transported through the cervical canal. This phase takes 2 to 10 minutes and may be facilitated by sperm motility as well as increased contractile activity of the myometrium and mesosalpinx during courtship and coitus. Some sperm reach the internal os of the cervix within 1.5 to 3 minutes after insemination. Thus, some sperm can reach the site of fertilization rapidly (Ptaszynska, 2006).

Whether the first sperm entering the oviduct participate in fertilization of the ovum is not known, it has been proposed that fertilization occurs only when a minimal number of sperm reach the site of fertilization. The stimulating of the vagina at coitus causes a reflex release of oxytocin, which in turn lead to contraction of the genital tract smooth muscles and increases the rate of sperm transport. On the other hand, clitoral stimulation at the time of artificial insemination causes oxytocin release from the caudal pituitary gland, which has positive effect on the sperm transported into female genital tract (Bozkurt et al., 2007).

The aim of this study was to determine the effect of oxytocin administration at the time of artificial insemination on the pregnancy rates of cows.

Materials and Methods

This research was carried out on five dairy herds located in Tabriz (north-west of Iran) suburb. One hundred Holstein cows with the same nutrition and management were chosen and categorized into 2 groups (A and B; 50 cows in each) randomly. After spending the voluntary waiting period (VWP=60 days), all of the cows were examined by rectal palpation for detecting any probable uterine infection. Cows with abnormal uterine discharges were omitted from the experiment. Heat detection was carried out by an expert technician. Cows were inseminated after observed estrus by a professional A.I technician and then 30 I.U oxytocin (Vetocin, produced by Aburaihan Company of Iran, each ml contains 10 I.U synthetic oxytocin) were
injected to the cows of group A. In the control group, 3ml saline was injected to the cows after insemination as placebo. After 45 days form A.I date, pregnancy examination was performed through rectal palpation on the cows of both groups and the results compared together with the Fisher's exact test.

Results

The pregnancy rate for group of A, was recorded as 58% (29 cows out of 50 cows) and for group of B (control group) was calculated as 54% (27 caws out of 50 cows). The results of two groups were analyzed by Instape program and Fisher's exact test. Any significant difference was not observed between two groups (P>0.05) (Table 1).

Table1: The pregnancy rates in two groups (A and B) after 45 days from A.I

<table>
<thead>
<tr>
<th>Group</th>
<th>Non pregnant cows</th>
<th>Pregnant cows</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>A (treated with oxtocin)</td>
<td>21(42%)</td>
<td>29(58%)</td>
<td>50</td>
</tr>
<tr>
<td>B (control group)</td>
<td>23(46%)</td>
<td>27(54%)</td>
<td>50</td>
</tr>
</tbody>
</table>

Discussion

Oxytocin is a hormone which is produced by the supraoptic nuclei in the hypothalamus and deposited in the caudal part of pituitary gland. At the time of copulation, oxytocin releases from the caudal part of pituitary gland in response to the vaginal stimulation and causes the smooth muscle contraction of genital tract. Consequences of this contraction are the enhancement in the sperm transport rate in the reproductive tract (Hafez, 2000).

Langendijk and co-workers (2003) in a study on the sows indicated that the external oxytocin administration or internal releasing of oxytocin by stimulation of flanks or dorsal parts of sows causes an increase in contraction of uterine muscles. In other study, Rodriguez et al. (1987) by administration of oxytocin in different periods of estrus cycle in the cows indicated that the internal uterine pressure (I.U.P) increases in response to oxytocin administration at all periods of estrous cycle. Therefore, according to the previous research and present study, it seems that oxytocin administration causes an increase in uterine contraction and enhances the sperm and ovum transport in the genital tract (Langendijk et al., 2005).

In conclusion, our results indicated that the low dose oxytocin administration at the time of A.I may enhance the pregnancy rate. We recommend the low dose oxytocin administration at the time of A.I, because of its low price and positive effect on the sperm transport and pregnancy rate.

Reference


