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PLASMA B-ENDORPHIN PROFILE DURING EARLY, INTERMEDIATE AND LATE PUERPERIUM IN FRIESIAN DAIRY COWS

(With 2 Tables & One Fig.)

By

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مستوى بلازما الببتا اندورفين أثناء فترة النفاس ودورة الشبق الأولى بعد الولادة في الأبقار الفريزيان الحلابه

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أجريت هذه الدراسة على ثمانى وعشرون من الأبقار الفريزيان الحلابه بعد ولاده طبيعيه. تم أخذ عينات دم فى الأسبوع الأول ، الثانى ، الثالث بعد الولادة وأيضاً أثناء دورة الشبق (مرحلة وجود جريب جراف والجسم الأصفر) للحصول على بلازما الدم بواسطة جهاز الطرد المركزى المبرد وحفظت عند - ٢٠ مئوية لحين التحليل الهرمونى. وتم تقدير الإندورفين بطرق المناعه الاشعاعيه الخاصه فى البلازما. وأظهرت النتائج بعد التحليل الاحصائى وجود زيادة معنويه غى مستوى الببتا اندورفين فى بلازما الدم فى الاسبوع الاول عن الثانى والثالث على التوالى. وكذلك وجدت زيادة معنويه أثناء الدورة الشبقيه فى حالة وجود جريب جراف بالمبيض بالمقارنه بمرحلة وجود الجسم الأصفر فى نفس الدورة.

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SUMMARY

This investigation was performed on 28 pluriparous dairy Friesian cows during the 1st, the 2nd and the 3rd weeks of puerperium in addition during the postpartum (PP) estrus cycle (Follicular and luteal stages). Blood samples were collected in heparinized vacutainer tubes, plasma was obtained by cooling centrifuge and kept frozen at -20°C until hormonal assay. A special radioimmunoassay technique was adapted for determination of plasma B-endorphin levels. The results revealed highly significant rise ($P < 0.01$) of B-endorphin profile in postpartum cows at the 1st week (70.31 ± 3.88 pg/ml) when compared with the 2nd week (57.37 ± 4.96 pg/ml) and the 3rd week (36.38 ± 3.17 pg/ml). Highly significant increase was observed in the follicular phase (53.46 ± 5.32 pg/ml) at the 1st estrus when compared with the luteal phase (35.03 ± 3.68 pg/ml) in the same estrus cycle of the studied animals.

INTRODUCTION

B-endorphin, peptide hormone, opiate-like activity has been found in a wide variety of vertebrates (LI 1982 and FONS & WILSON 1983). B-endorphin has continuously been found to exert a significant influence on several parameters of reproductive physiology (QUIGLEY & YEN 1980 and BLANKSTEIN *et al.*, 1981). The endorphin system is activated during pregnancy, resulting in an increase in the pain threshold before parturition (GINTZLER 1982). CSONTOS *et al.* (1979) have already shown that maternal plasma levels of ACTH and B-endorphin were markedly elevated during labor, with highest concentration after delivery. Additionally, a gradual decrease in the B-endorphin level in buffalo-cows during the postpartum period, yet it was significantly higher than non-pregnant controls in all groups at all stages of the postpartum period except few days before the onset of the 1st postpartum estrus (ABU-ZEAD 1990). Moreover, ISMAIL *et al.* (1989) reported that the plasma levels of estrogen in postpartum dairy Friesian cows was gradually and significantly decreased from the 1st week through the 3rd week postpartum. Concurrently, HULSE and COLEMAN (1984) noted that the immunoreactive B-endorphin are greater when progesterone are low (e.g. at diestrus or proestrus) and lower when progesterone levels are higher (e.g. at metestrus).

The objective of this study was to elucidate and to monitor plasma B-endorphin profile in Friesian cows during the

early, intermediate and late puerperium and at the onset of 1st postpartum cyclicity.

MATERIALS AND METHODS

This study was performed on 28 dairy cows that had normal parturition (i.e. normal expulsion of fetus and placenta). Blood samples were collected in heparinized vacutainer tubes from 21 pluriparous dairy cows during the 1st., the 2nd., and the 3rd weeks of puerperium in addition from 7 cows at 1st. postpartum (pp) estrus cycle (follicular and luteal phases). Blood samples were kept on ice, plasma separated by a cooling centrifuge and stored at -20°C until hormonal assay. The B-endorphin concentration in the plasma was assayed by a special radioimmunoassay technique adapted for the determination of B-endorphin using the New England Nuclear B-endorphin radioimmunoassay kit (1²⁵), cat. NEK-003 in plasma according to *Guillemin et al.* (1977). Cross reaction was done to qualify the adaptation of the kits to cattle B-endorphin.

RESULTS

Plasma levels of B-endorphin in the dairy Friesian cows which had normal parturition with normal placental dropping are depicted in Table (1) and Figure (1). The plasma B-endorphin values gradually and significantly decreased from the 1st week (70.31 ± 3.88 pg/ml) through the 2nd week (57.37 ± 4.96 pg/ml) and week postpartum (36.38 ± 3.17 pg/ml). Concomitantly, plasma B-endorphin levels then rose progressively and significantly with the onset of the follicular phase (53.46 ± 5.32 pg/ml) and thereafter declined during the luteal phase (35.03 ± 3.68 pg/ml) in the same estrus cycle (Table 2 & Figure 1).

Table 1: B-endorphin levels during the early, the intermediate and the late puerperium.

n = 21

| Stage | No. | B-endorphin (pg/ml) |
|----------|-----|---------------------|
| 1st week | 7 | 70.31 ± 3.88^a |
| 2nd week | 7 | 57.37 ± 4.96^b |
| 3rd week | 7 | 36.38 ± 3.17^c |

a and b significant different from each other at 1% level.

b and c significant different from each other at 1% level.

a and c significant different from each other at 1% level.

Table 2: B-endorphin levels during the follicular and the luteal phases.

n = 7

| Phase | B-endorphin (pg/ml) |
|------------|---------------------|
| Follicular | 53.46 \pm 5.32* |
| Luteal | 35.03 \pm 3.68 |

* Highly significant at $P < 0.01$.

DISCUSSION

It is now recognized that a given peptide may be present in multiple tissue (Krieger and Martin 1981). ACTH and B-endorphin which are derived from the precursor molecule, pro-opiomelanocortin (Main *et al.*, 1977; Roberts and Herberts 1977) are present in pituitary, brain placenta and pancreas (Li & Chung 1976; Bradburg *et al.*, 1976; Bruni *et al.*, 1979 and Liotta & Krieger 1980).

The current investigation revealed an inverse relationship between progesterone and B-endorphin, since B-endorphin concentration was significantly higher when progesterone was lower during follicular phase, (53.46 \pm 5.32 pg/ml) and become lower when progesterone levels are higher during luteal phase, (35.03 \pm 3.68 pg/ml) a deduction which is consistent with the findings of HULSE and COLEMAN (1984).

In the present study, the level of B-endorphin gradually and significantly declined from the 1st week through the 3rd week postpartum and then more increased at the follicular phase than during the luteal phase. Our results are greatly similar with those of ABDU-ZEAD (1990) in buffalo-cows at puerperium and during the 1st estrus cycle. Furthermore, ISMAIL *et al.* (1989) found that plasma levels of progesterone in postpartum dairy Friesian cows gradually and significantly increased from the 1st week to the 3rd week. In virtue of this, may in part, explain the gradual postpartum decline in B-endorphin levels from the 1st through the 3rd weeks postpartum. Moreover, WARDLAW *et al.* (1982) have reported, in the rat, that sex steroids affect the brain content of B-endorphin. They suggested that estradiol acts to stimulate the release of B-endorphin from the hypothalamus.

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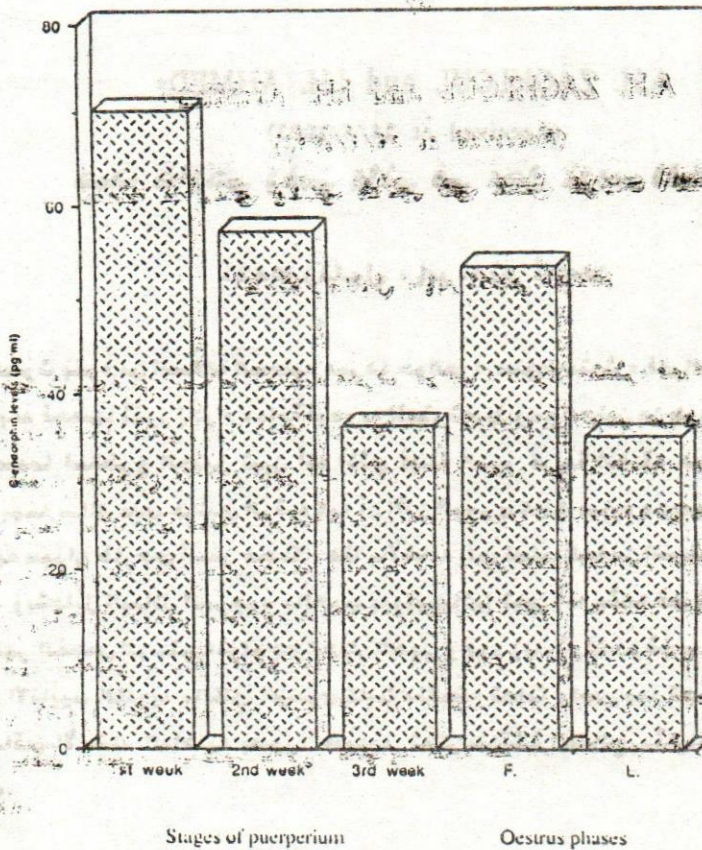


Fig. (1): Plasma B-endorphin levels during different stages of puerperium and the 1st oestrus cycle (follicular, F and Luteal, L. phases) in cows