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Response of plasma LH to gonadotropin releasing hormone (LRH) treatment in young swamp buffalo bulls.

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Summary

Investigation on response of LH to gonadotropin releasing hormone (LRH) treatment in 3 young swamp buffalo bulls was carried out every second month for 4 occasions. The animals were 16, 17 and 19 months old at the beginning of the trial. Response of plasma LH to LRH treatment was described in term of "total response" calculated from the area under the curve during 150 mn. It was shown that magnitude of LH response of the animals at the age group of 16-18 mo. was higher than those in the older age groups (19-21 mo and 22-25 mo). Mean plasma LH decreased to preinjection levels within 5.5 h after LRH treatment. Furthermore, mean total LH response ($\mu\text{g/ml} \times 150 \text{ mn}$) was highest in the younger age group 1.03 ± 0.33 when compared with

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those in the 2 older age groups (0.87 ± 0.12 and 0.51 ± 0.19 respectively). The total LH responses of the younger and older groups were different from those of the mean (0.82 ± 0.28) which was similar to those in the 19-21 mo group. This finding indicated the more sensitive of hypophysis to LRH treatment in the younger animals than those reach puberty and after.

Introduction

If is well established that administration of gonadotropin releasing hormone (LRH) induces synthesis and release of plasma LH and testosterone in prepubertal bulls (Mongkonpunya et al., 1975) in young bulls prior to and during puberty as well as post-puberty (Chantarapruteep and Thibier, 1979) and even as early as one day old calves (Kesler and Garverick, 1977). This test might be useful for study of capacity of hypophysis and further application for bull selection. As LH promotes growth and function of the interstitial or Leydig cells and thus control the secretion of the male sex hormone, testosterone. Our report on circadian variation of plasma LH and testosterone of 3 young swamp buffalo bulls indicated their variations in the pattern and concentrations among individuals. (Chantarapruteep et al., 1981). The present study was aimed to test and compare plasma LH responses to LRH treatment among individual swamp buffalo bull and also compare individual responses to repeat LRH treatment every 2 months interval.

Materials and Methods

Three swamp buffalo bulls no. BB 1001, BB 1006 and BB 1008 aged 16, 17 and 19 months old and weighed 270, 260 and 350 kg respectively at the beginning of the trial. They were born and reared under the same management conditions at Chulalongkorn Veterinary Students Training Center, Nakorn-Pathom. A synthetic gonadotropin

releasing hormone (LRH), contains 0.1 mg/ml. (Intervet, 49005 Angers, France) was used.

After a first sample prior to 0.25 mg LRH injection, blood was taken every 15 mn for 2.5 h and thereafter every 1h for another 4 h. All blood samples were collected by jugular venepuncture into heparinized test tubes. They were immediately centrifuged, plasma was separated and stored until at -20°C required for assay. LH was measured in all plasma sample from the same manipulation, by radioimmunoassay, as described previously by Kamonapatana *et al.*, (1979).

The experiment was performed every second month from October 1978 to April 1979. Only the bull no. 1008 was missing for the last treatment.

Estimation of response of plasma LH to LRH treatment was described in term of "total response" calculated from the area under the curve during 150 mn as described by Thibier (1976). It is expressed as $\mu\text{g/ml} \times 150 \text{ mn}$. Due to small number of experimental animals, they were then divided into 3 range of age groups; between the age of 16-18 months ($n = 3$), 19-21 months ($n = 5$) and 22-25 ($n = 3$).

Results

Mean (\pm S.D.) of responses of plasma LH to 0.25 mg Gonadotropin releasing hormone (LRH) injection for the 4 experiments is shown in figure 1.

Prior to each LRH treatment, basal level of plasma LH of each age group was low, around 0.25 ng/ml. Fifteen minutes after the treatment, LH concentrations raised between 1-4 ng/ml and attained the first peak within 30-45 mn. The highest peak of 8 ng/ml was observed in the age group of 16-18 mo. while for another 2 older age groups of 19-21 mo. and 22-25 mo. they were around 7 and 4 ng/ml

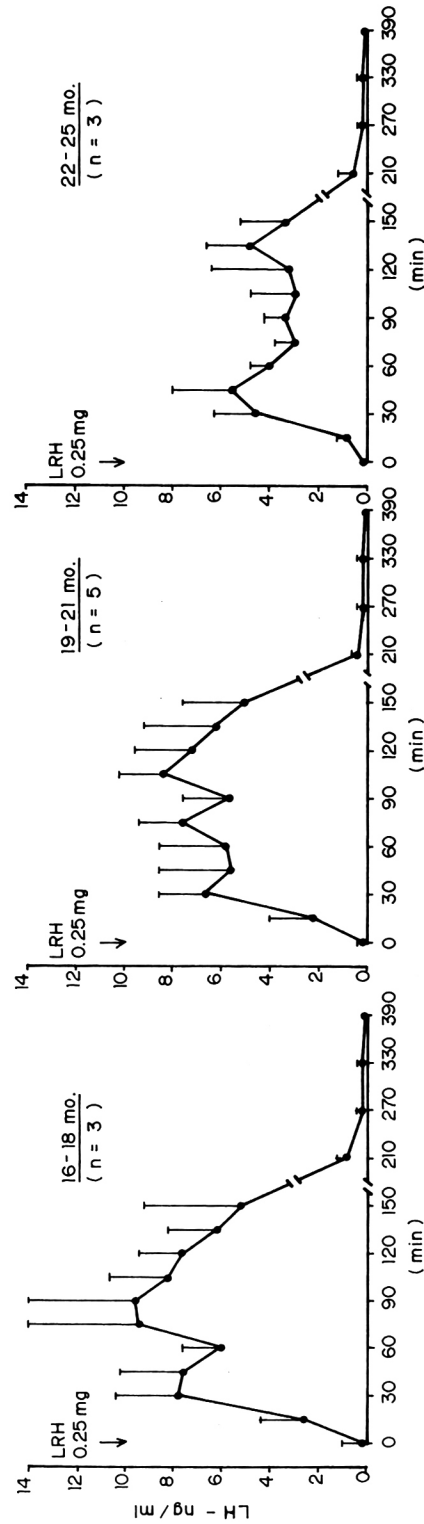


Fig 1 Plasma LH concentration (ng/ml) following treatment with 0.25 mg LRH ($\bar{X} \pm SD$) in each age group of swamp buffalo bulls.

respectively. Mostly, concentration of plasma LH decreased at 60 mn subsequently it increased again and attained the second peak of 10, 8 and 5 ng/ml respectively at 90, 105 and 135 mn in the first, second and third groups respectively. Mean plasma LH declined to preinjection concentrations within 5.5 h after LRH treatment. The mean maximum increase in plasma LH after LRH was higher at 16-18 months (about 8 ng/ml) and was reached within 30 mn whereas at older aged it was less than 7 ng/ml and the maximum was reached within 30-45 mn.

Mean total LH responses ($\mu\text{g/ml} \times 150 \text{ mn}$) were 1.03 ± 0.33 , 0.87 ± 0.12 and 0.51 ± 0.19 respectively for 16-18, 19-21 and 22-25 mo. groups. As illustrated in figure 2, it was significantly higher in the first group (16-18 mo.) than the mean ($0.82 \pm 0.28 \text{ ng/ml}$) ($P < 0.05$). Whereas in the oldest group (22-25 mo.) it was significantly lower than the mean ($P < 0.01$). The 19-21 month group was intermediate.

Discussion

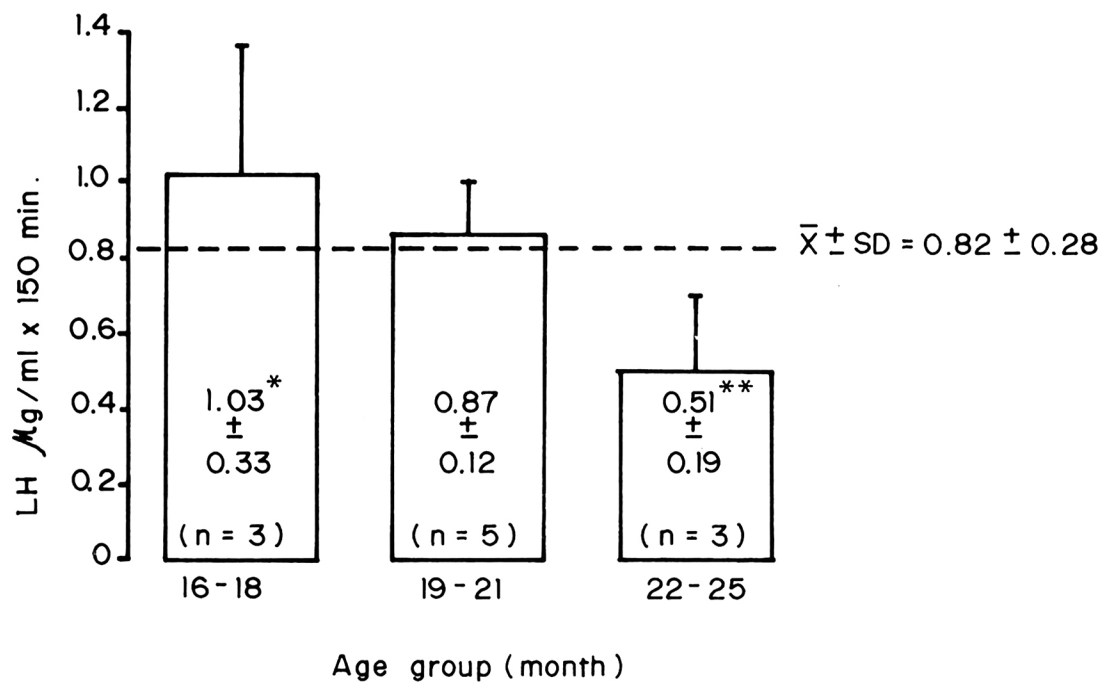
The present study demonstrated that LRH was able to induce an increase in the plasma LH concentration in swamp buffalo bulls. The mean magnitude of response to LRH appears to be age dependent and significantly higher prior to 19-21 mo. group of age than after. This findings confirm primarily that the hypophysis is very sensitive to LRH at early ages and much before puberty. It is even more interesting is the fact that this sensitivity appears to decline at least 2-3 mo. prior to puberty. Parlow *et al.* (1964) reported that the quantities of stored pituitary LH in the pigs were at least twice as high in prepubertal than in postpubertal males, which is consistent with the present findings. Similarly, McMillan and Hafs (1968) and later Purchas *et al.* (1970) observed a regular increase of the weight of the

hypophysis during the first months of life in calves. In lamb, Foster (1974) and Courot *et al.* (1975) also found an increased activity of the hypophysis before puberty compared to after. Puberty as demonstrated recently (Chantarapruteep *et al.*, 1985) in the swamp buffalo bull was around the age of 20 mo. In this study apart from that the magnitude of the LH response, age also modified the time course of the response. The concentrations of LH was elevated many times above the preinjection concentrations in the 3 age groups. This elevation seems more rapid in the young animals than in the older ones. Both the higher magnitude of the LH response and the shorter latency from the LRH injection, therefore, occur in the pre-pubertal period. The LH release is very sensitive to LRH at the younger ages and as the interstitial cells increase their secretory activity the pituitary sensitivity seems to decrease. These findings support the fact that during the prior puberty period, which occurs around 16-18 mo. of age in this species of which the balance in the pituitary-testis interaction is reached (Chantarapruteep *et al.*, 1985) Because of this time occurrence, it is fair to speculate that such a balance should be reached and required before the onset of spermatogenesis.

Although the number of animals submitted to the test at all age group was small, but the findings depicted evidence that LH responses to LRH injection according to age and a mean response seems to be higher before puberty and therefore before the onset of spermatogenesis.

Acknowledgement

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* differ from mean, significantly ($P < 0.05$)

** differ from mean, significantly ($P < 0.01$)

Fig 2 Total response ($\bar{X} \pm SD$) of LH ($\mu\text{g} / \text{ml} \times 150 \text{ min}$) following treatment with 0.25 mg LRH in each age group.

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บทย่อ

การตอบสนองของ luteinizing hormone (LH) ในพลาล์ม่า ต่อการฉีด gonadotropin releasing hormone (LRH) ในกระป๋องปลั๊กวัยหนุ่ม

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ศึกษาการตอบสนองของ LH ต่อการฉีด gonadotropin releasing hormone (LRH) ในกระป๋องปลั๊กวัยหนุ่ม 3 ตัว โดยทดลองทุก 2 เดือนรวม 4 ครั้ง เมื่อเริ่มการทดลองกระป๋องมีอายุ 16, 17 และ 19 เดือน การตอบสนองของ LH ในพลาล์ม่าต่อการฉีด LRH วัดในรูป "total response" คำนวณจากพื้นที่ภายใต้ curve ในช่วงเวลา 150 นาที หลังฉีด ผลการศึกษาแสดงให้เห็นว่าระดับการตอบสนองของ LH ของกระป๋องที่กลุ่มอายุ 16-18 เดือน สูงกว่ากลุ่มที่มีอายุแก่กว่า (19-21 และ 22-25 เดือน) ค่าเฉลี่ย LH ในพลาล์ม่า ลดลงมาอยู่ในระดับก่อนฉีดภายในเวลา 5.5 ชม. หลังการฉีด LRH ยิ่งกว่านั้นค่าเฉลี่ย total LH response ($\mu\text{g/ml} \times 150$ นาที) ในกลุ่มที่อายุน้อยจะสูงสุด 1.03 ± 0.33 เมื่อเทียบกับกลุ่มที่มีอายุมากกว่าทั้งสองกลุ่ม (0.87 ± 0.12 และ 0.51 ± 0.19 ตามลำดับ) total LH response นี้ในกระป๋องกลุ่มอายุน้อยและมากแตกต่างจากค่าเฉลี่ย (0.82 ± 0.28) ซึ่งใกล้เคียงกับในกลุ่มอายุ 19-21 เดือน ผลการศึกษานี้ชี้ให้เห็นว่าต่อมใต้สมองของกระป๋องในกลุ่มอายุน้อยจะไวต่อ LRH มากกว่ากระป๋องที่ถึงวัยเจริญพันธุ์แล้ว และอายุมากกว่า

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