FOLLICULAR DEVELOPMENT IN POST-PARTUM ANOESTRUS BUFFALOES

PRAVEEN KUMAR M[1], VEERA BRAMHAIAH K[2*], MUTHA RAO M[3] AND GANGARAJU G[4]
Veterinary Gynaecology & Obstetrics, College of Veterinary Science,
Sri Venkateswara Veterinary University – Tirupati.

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ABSTRACT

Pattern of ovarian follicle development and regression was studied in 14 Postpartum Anestrus Buffaloes having >60 days postpartum period. The mean follicles number on both the ovaries was 1.82 ± 0.12 with overall maximum diameter of 7.50 ± 0.33 mm and the same was 8.07 + 0.48 and 6.97 + 0.45 mm on right and left ovaries, respectively. During this Postpartum Anestrus the period follicular development either stopped or undergone atresia without reaching dominance and ovulation. The mean growth rate of follicles was 0.46 + 0.22 and 0.20 + 0.21 mm per day on right and left ovaries, respectively with overall growth rate of 0.55 + 0.13 mm per day, while the mean atresia rate was -0.06 + 0.35 and -0.80 + 0.17 mm per day on right and left ovaries, respectively with an overall atresia rate of -0.75 + 0.11 mm per day. The correlation co-efficient of follicle diameter with follicle growth rate was positively insignificant (P>0.05) while the same with follicle atresia rate was negatively insignificant (P>0.05).

Key words: Buffaloes, Post-partum anestrous, follicular development

INTRODUCTION

India is the home tract of the world's best dairy buffaloes (Chawla, 1998). Major limitation to the success of buffaloe breeding after each calving is postpartum anestrus (Singh and Sahni, 1995) with functional disorder of ovaries and constitute to about 19 to 74% (Vale, 1994). Anestrus is a state of ovarian acyclicity and ovarian follicle plays an integral part in regulating the oestrous cycle. Since there is little information on ovarian follicle development during post-partum period of buffaloes, knowledge on the pattern of follicular development indicate the functionality of follicular dynamics in buffaloes (Vassena et al., 2003). Hence this study was aimed at the follicular development in case of post-partum anestrous buffaloes by ultrasound scanning of the ovaries.

MATERIALS AND METHODS

The present study was carried at Livestock Research Station, Venkata ramannagudem, West Godavari district, AP by utilizing a total of fourteen buffaloes having 60 days and above post-partum period. All the animals were maintained under uniform managemental and husbandry conditions. All these were thoroughly examined for reproductive health and ovarian status by per rectal examination followed by transrectal ultrasonography (sonoray DS-30 plus Portable LCD B/W Ultrasound Scanner with 6.5 MHz linear-array transducer) before starting the experiment. Again the animals were examined for the absence of corpus luteum in two successive intervals 10 days apart and considered them as true postpartum anestrus animals.

Both the ovaries were scanned for the presence of follicles having more than three millimetres diameter at every alternative day for a period of 16 days and recorded maximum follicular diameter, growth rate and atresia rate of the pre-ovulatory follicle in a follicular wave. Follicle growth was considered from the day of appearance of follicle with more than 3 mm diameter to till the growth of the follicle was stopped or initiated reduction in the diameter of the follicle. Growth rate (mm/day) of follicles was calculated by subtracting the diameter on the day of detection from maximum diameter and dividing this by the interval in days (Rhodes et al., 1995).

Follicle growth rate (mm/day) = [Maximum follicle diameter - Minimum follicle diameter] / Number of days of growth.

Follicle atresia onset was considered as the day from which follicles began reducing in size during the period of initial examination before starting the protocol. The follicle atresia rate was assessed by calculating the change in the follicular diameter over the time.

Follicle regression rate (mm/day) = [Minimum follicle diameter - Maximum follicle diameter] / Number of days of regression

RESULTS AND DISCUSSION

Number of follicles

Follicle development was assessed based on the follicles having more than 3 mm diameter and by recording the process of selection, development and atresia of a dominant follicle. The mean follicles number on right and left ovaries in the post-partum anestrus buffaloes was 1.83 ± 0.17 and 1.81 ± 0.17, respectively with overall mean follicles of 1.82 ± 0.12 per animal on both the ovaries (Table No. 1). Lesser number of follicular

[1] MVSc, Scholar, [2]Professor and Head, VGO, CVSc, Tirupati, [3]Principal Scientist, LRS, Lam, Guntur and [4]Principal Scientist, LRS, Palamaner. * bramhaiahvet@yahoo.com

developments observed in the study might be due to variations in the energy balance observed based on the nutritional status, body condition, milk production and parity (Walsh et al., 2011).

MAXIMUM DIAMETER OF FOLLICLE

The overall mean maximum diameter of follicle during postpartum period was 7.50 ± 0.33 mm (range from 4.00 to 12.00 mm). Same in right and left ovaries was 8.07 + 0.48 (range from 3.00 to 12.5) and 6.97 + 0.45 (range from 3.00 to 12.5) mm, respectively (Table No. 1 and Fig No. 1). In accordance to the observations of the present study Malik (2005) recorded mean dominant follicle diameter of 7.40±0.44 mm during <30 days post-partum period and 11.02±0.71 mm after 60 days post-partum period. However, the mean diameter of dominant follicle in the present study is higher than observation of Presicce et al. (2005a) (14.1 ± 0.4mm); Satheshkumar et al. (2011) (10.9±0.7mm) and Naseer et al. (2012) (9.9 ± 0.5 mm).

These follicles continued their development for certain period of time and later the growth was either stopped or undergone atresia without proceeding to ovulation leading to post-partum anestrus. Failure of development of these follicles up to ovulation during postpartum period might be due to the failure of restoration of pulsatile release of LH because of absence of pulsatile GnRH secretion from the hypothalamus leading to anestrus condition (Nett, 1987). Out of 14 post-partum buffaloes studied 5 buffaloes ovaries were smooth and inactive but with small follicles of 3-4 mm diameter without showing further development. Absence of follicular structures on the ovary might be due to suppressive effect of animal over FSH production leading to suppressed follicular growth. About 4 buffaloes exhibited follicles with > 9 mm diameter but they also did not proceed to ovulation and have undergone atresia. It might be due to disruption of the feedback mechanisms in the hypothalamic–pituitary axis (Vanholder et al., 2006). The correlation co-efficient of follicle diameter with follicle growth rate was positively insignificant (P>0.05) while the same with follicle atresia rate was negatively insignificant (P>0.05) (Table No. 2).

FOLLICLE GROWTH RATE

The overall mean growth rate of follicle on both the ovaries during pre-treatment period was 0.55± 0.13 mm per day and 0.46 ± 0.22 and 0.20 ± 0.21 mm per day on right and left ovaries, respectively in postpartum anestrus buffaloes. The correlation co-efficient of follicle growth rate with follicle diameter was positively insignificant (P>0.05) while the same with follicle atresia rate was negatively insignificant (P>0.05) (Table No. 2). The follicle growth rate recorded in the present study is lower than the findings of Malik (2005) (0.83±0.05mm/d); Presicce et al. (2005a) (1.07 ± 0.07mm/d) and Satheshkumar et al. (2011) (1.73±0.10mm/d)

The overall mean atresia rate of follicle on both the ovaries during pretreatment period was -0.75± 0.11 mm per day and -0.06 ± 0.35 and -0.80 ± 0.17 mm per day on right and left ovaries, respectively in postpartum anestrus buffaloes. The correlation co-efficient of atresia rate with follicle diameter was negatively insignificant (P>0.05) while the same with follicle growth rate was positively insignificant (P>0.05) (Table No. 2). The mean atresia rate recorded in the present study was in contrary to the findings of Satheshkumar et al. (2011) who was recorded higher regression rates in estrus buffaloes (1.5 ± 0.23 and 1.96 ± 0.10 mm/day) during first and second follicular waves.

Thus, concentrations of FSH decline during selection of divergence in growth rate of the dominant follicle versus subordinate follicles leading to the decline in the follicle number and growth. Upon demise of dominant follicle, the follicular products responsible for suppressing FSH drop and the circulating concentrations of FSH are again allowed to surge resulting in new wave emergence without estrus leading to postpartum anestrus.

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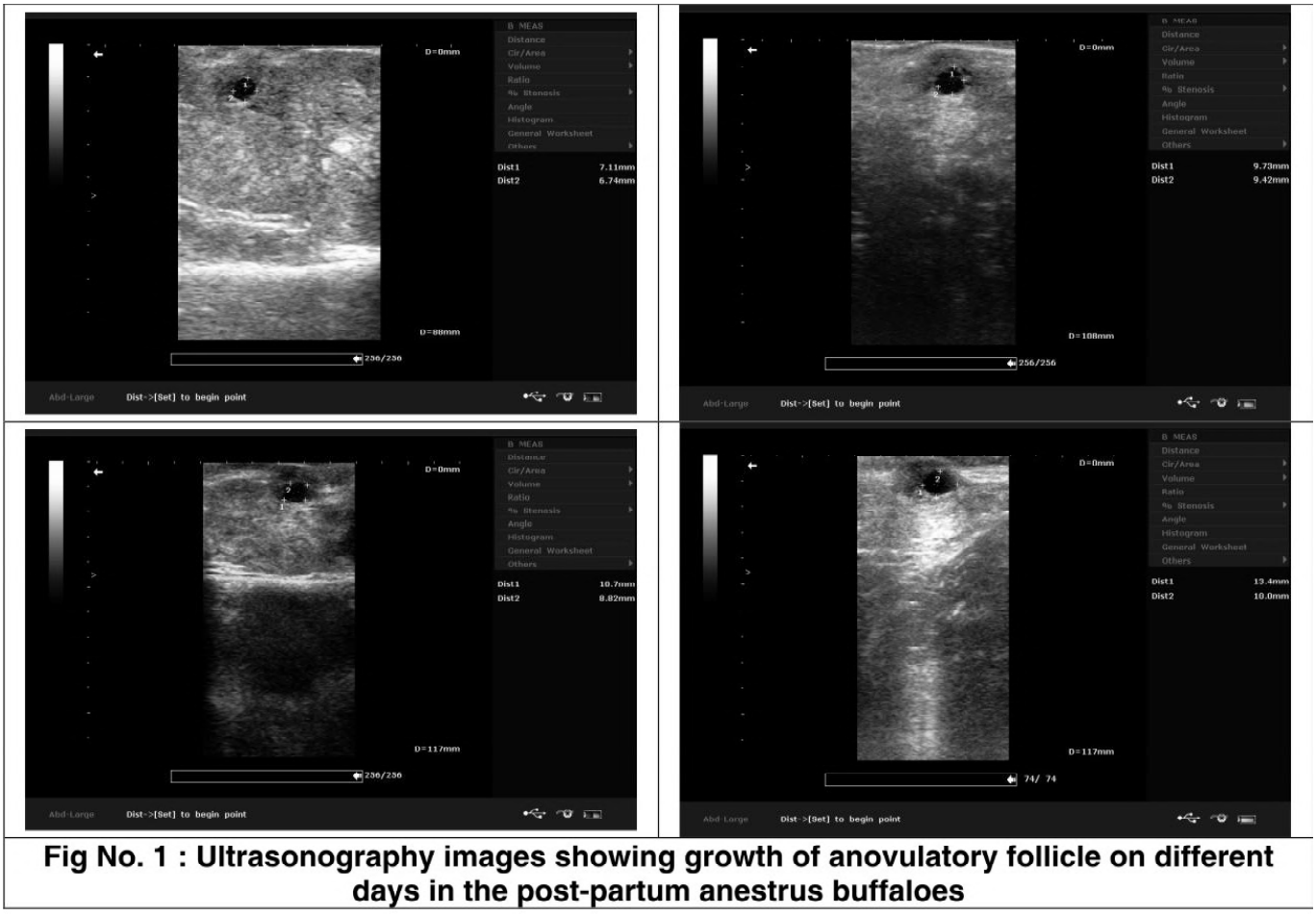

Fig No. 1 : Ultrasonography images showing growth of anovulatory follicle on different days in the post-partum anestrus buffaloes

Table No 1: Mean (±SE) Follicle number, Maximum follicular diameter, Growth rate and Follicle Atresia rate in Post-partum Anestrus Buffaloes

Particulars	Both ovaries	Right Ovary	Left Ovary
Follicle numbers	1.82 ± 0.12	1.83 ± 0.17	1.81 ± 0.17
Maximum follicular diameter (mm)	7.50 ± 0.33	8.07 ± 0.48	6.97 ± 0.45
Follicle growth rate (mm/d)	0.55± 0.13	0.46± 0.22	0.20± 0.21
Follicle Atresia rate (mm/d)	-0.75± 0.11	-0.06± 0.35	-0.80± 0.17

Table No 2: Correlation Co-efficient of maximum follicular diameter with growth rate and atresia rate in Post-partum Anestrus Buffaloes

Particulars	Max. Follicular diameter	Follicle Growthrate	Follicle Atresiarate
Max. Follicular diameter	1.00		
Follicle growth rate	0.01^{NS}	1.00	
Follicle Atresiarate	-0.11^{NS}	0.12^{NS}	1.00

NS: Non-significant (P≥0.05)