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**Arabic summary**

### Summary

The present study was devoted to clarify fluctuations of some blood parameters ( including enzymes, proteins, cholesterol and high density lipoproteins, hormones and insulin - like growth factor-1 ) in the blood of buffalo heifers during growing, prepubertal and pubertal stages. For this purpose, 12 growing buffalo heifers ( 5 - 8 months - old ) located at The Experimental Buffalo Farm of Animal Reproduction Research Institute, Al-Haram were used. During the experimental period, heifers were preserved under continuous veterinary supervision and supplied with a balanced concentrated ration that was formulated to meet the growth energy, protein and mineral requirements for growing. According to the age / month, heifers were classified into growing ( 5 - 8 ) prepubertal ( 9 - 12 ) and pubertal ( 13 - 16 months ).

Individual blood samples were collected once weekly from all experimental heifers during the different stages of growth and every 3 days after estrus detection for 2 estrous cycles, to evaluate the various serum biochemical constituents. Moreover, according to ultrasonographic detection during the estrous cycles, blood samples were divided into follicular and luteal phases. A portion the serum was used directly for determination of the enzymatic activities of ALT and AST while the rest was preserved at - 20°C till determination of total proteins, albumin and globulins as well as total cholesterol and high density lipoprotein " HDL " in addition to trace elements ( Zn and Cu ); hormones ( T<sub>3</sub>, T<sub>4</sub>, estradiol - 17β and progesterone ) and insulin - like growth factor-1 ( IGF-1 ).

The obtained data, after statistical analysis, showed that serum activity of ALT and AST underwent gradual decline with advancement of age to reach the lowest in pubertal heifers. It was also detected that age of the heifer or phase of the cycle did not influence serum levels of protein and trace elements. Regarding total cholesterol, its serum level showed gradual increase associated with the progress of age but the only significant one was detected when the animals reached puberty. Also, the mean value of total cholesterol during follicular stage did not differ significantly than that recorded at the luteal one.

Concerning serum levels of high density lipoproteins, they had a similar pattern like that of cholesterol. The minimal value was detected in growing animals, increased insignificantly during prepubertal stage and reached the maximum at puberty.

Concerning hormones, It appears that thyroid hormones activity in the serum of buffalo heifers showed significant increase concomitant with the onset of puberty as compared with the corresponding levels in growing and prepubertal heifers. In addition, during the estrous cycle, T<sub>3</sub> level at follicular stage reached its highest value while T<sub>4</sub> serum level, although it increased significantly in pubertal heifers as compared with growing and prepubertal animals, yet its serum value did not markedly change in follicular and luteal phases.

Serum levels of estradiol 17- $\beta$  in buffalo heifers revealed that it was minimal in growing animals, slightly increased in prepubertal heifers and reached its peak during the follicular stages of the cycle then declined significantly at the luteal phase.

Regarding progesterone, its serum level among growing and prepubertal heifers was negligible before the onset of puberty. During the estrous cycle, maximal serum progesterone concentration was detected at the luteal phase then this peak declined during the follicular phase.

Ultrasonographic examination of prepubertal and pubertal heifers revealed that ovaries of prepubertal heifers were completely devoid of corpora lutea and the only ovarian structures were represented by small follicles of varying size ranging from 2 - 4 mm in diameter. In addition, During the follicular stage of the cycle, the diameter of the Graafian follicle ranged between 0.80 - 1.10 mm while during the luteal stage, the diameter of the corpus luteum ranged from 1.20 - 1.65 mm. These findings detected by ultrasonographic examination confirmed the assayed hormonal levels of estradiol 17- $\beta$  and progesterone during different stages of growth.

Levels of insulin - like growth factor-1 ( IGF-1 ) in buffalo heifers showed fluctuations during different stages of growth. Serum IGF-1 increased significantly in the prepubertal stage than the corresponding level recorded in growing animals. In addition, the peak of serum IGF-1 was detected after puberty during the follicular stage. On the other side, during the luteal stage of the cycle, IGF-1 level was also high but lower than that during the follicular stage and did not differ significantly than its value among prepubertal heifers.

From the present study it could be concluded that buffalo heifers must be kept under continuous veterinary observation. Also, the ration should be balanced to meet the growth energy and requirements for

growing heifers. Determination of the blood parameters helps in following the status of the animals and deviations in these parameters should be corrected to avoid both productive and reproductive disorders. Also, ultrasonography application for the diagnosis of ovarian structures in buffaloes predominates over rectal palpation as it is more sensitive, accurate, save and of higher positive predictive value.