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EFFECT OF PROSTAGLANDIN AND OXYTOCIN INJECTION ON SOME BIOCHEMICAL PARAMETERS IN AWASSI EWES OF IRAQ

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Abstract

A study was designed to evaluate the effect of Prostaglandins (PGF2α) and oxytocin on some biochemical parameters in Awassi ewes in Iraq. The study was conducted on 17 pregnant Awassi ewes aged 3-4 years, presented in the farms of College of Veterinary Medicine/ University of Fallujah. After parturition the animals were divided in to three groups: First group control (5) injected with 2ml of distal water. Second group PGF2α (6) injected with 7.5 mg. Third group oxytocin (6) injected with (20 I.U). The blood samples for biochemical assay. Glucose, Urea, Triglycerides and vLDL were significantly ($P \leq 0.05$) increased in the oxytocin group as compared with other groups. Cholesterol and LDL were showed exhibited higher significant different ($P \leq 0.05$) in control group. Total protein, Albumin, Globulin, Creatinine and HDL were showed no significant different ($P \leq 0.05$) between groups. In conclusion, effects of prostaglandin and oxytocin injection were noticed on increased and lower some biochemical parameters in Awassi ewes of Iraq.

Key words: Prostaglandin, Oxytocin, Biochemical parameters, Awassi ewes.

Introduction

Prostaglandin is a group of physiologically active fatty compounds called eicosanoids that have a variety of hormone-like effects in animals. The hormone Prostaglandin produced is inside the animal cell membrane and has an autocrine and paracrine effect. This hormone acts on the transport of ions, stimulates inflammation, balances blood pressure and improves blood flow, regulate pain, vasodilation, metabolism, reproduction and fever responses, as well as adjust synaptic transmission (Devlin, 2011; Cooper and Hausman, 2016; Faye and Bengoumi, 2018). This hormone is manufactured from a group of estimated 20 fatty acid fatty acids, such as arachidonic acid (20:4) originated from membrane lipids (Squires, 2003). Oxytocin is a polypeptides neurohormone involved in mother and offspring bonding, which consist of 9 amino acids beside two-sulfide bridge between two cysteine in the molecule generated by the hypothalamus and generated from the posterior pituitary gland, induce smooth muscle contraction. These encompass the dorsal muscle cells of the milk that fail in the mammary gland and in the uterus muscle to shrink the uterus during delivery (Squires, 2003; Faye and Bengoumi, 2018). Biochemistry is important diagnostic tools to assess metabolic and body health status in animals. The objective of this study is to study the effect of prostaglandin and oxytocin injection on some biochemical parameters.

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Materials and Methods

The study was carried out on 17 pregnant Awassi ewes, presented in the farms of College of Veterinary Medicine, University of Fallujah. The age of the animals ranged between 3-4 years with 2-3 parturition. Having similar management conditions and randomly selected from entire farm, Animals were daily fed per head of green roughages and 0.5 kg of barley grains (Farid, 1995). Mineral blocks and water were available *ad libitum*. After parturition the animals were divided in to three groups: First group (5 animals) injected with 2ml of distal water as a control group. Second group (6 animals) injected with 7.5 mg of prostaglandin F2α. (I.M). Third group (6 animals) injected with (20 I.U) of oxytocin (I.M). Blood samples were collected via heparinized vacationer tubes (5 ml). The plasma were harvested following

centrifugation of the samples (3000 RPM for 15 minutes) and stored under -20°C until assay. Biochemical parameters were also estimated includes; Glucose (Trinder, 1969), total proteins (Gomall *et al*., 1949), albumin (Doumasa *et al*., 1971) were involved. Globulin was calculated by taking the difference between total protein and albumin. Urea (Williams *et al*., 1978), creatinine (Henry, 1974), Cholesterol (Allain *et al*., 1974) concentrations were quantitatively determined using the kit provided by Agappe Diagnostice Company, Switzerland, Triglycerides (Schettler and Nussel, 1975) and High density lipoproteins (HDL) (Kostner, 1976). The kit was provided by Biomerieux Company, France. Low density lipoproteins (LDL) was calculated by equation= cholesterol- HDL+ vLDL and Very low density lipoproteins (vLDL) was calculated by dividing the Triglycerides by 5 (Friedewald *et al*., 1972).

Statistical analysis were performed using General Linear Model (GLM) procedure in the SAS program (SAS, 2012) to examine the influence of groups on biochemical parameters. Differences among means were compared using the Duncan multiple range test (Duncan, 1955).

Results and Discussion

The results of the blood biochemical parameters of Awassi ewes treated with prostaglandin and oxytocin are shown in table 1. The results indicate significant between treatment groups ($P<0.05$) in Glucose, Urea, Cholesterol, Triglycerides, LDL and vLDL. Whereas, the results showed no significant differences between groups for Creatinine, Total protein, Albumin, Globulin and HDL. The mean concentration of glucose were higher significantly in Ewe on oxytocin than on prostaglandin and control. Increased glucose concentration in the blood after administration of oxytocin is other cause to the release of glucagon because oxytocin has activating effect on glucagon, leading to increased insulin secretion in different animals (Bjorkstrand *et al*., 1996). However, oxytocin increases the secretion of the hormone directed to the adrenal gland mediated by CRH and, as a result, increases the level of cortisol. This increase in cortisol concentration may be due to increased plasma glucose concentration by reducing the use of glucose (Guyton and Hall, 2006). Reduction level of prostaglandins can be achieved through inhibition of prostaglandin synthase such as indomethacin and aspirin (Squires, 2003). Significant differences were noticed in plasma urea concentration over the study increase concentrations were observed in groups control and, oxytocin and lesser in prostaglandin group. Prostaglandins have an important role in pathology and physiology of urinary system. Endothelium derived nitric oxide synthesized in the kidney inhibits sodium reabsorption, mediating pressure natriuresis and diuresis Prostaglandin has an important role in physiology and urology. It slows nitric oxide derived from lining in the kidney, inhibits sodium absorption and mediates the pressure of the sodium excretion in the urine and increased urination (Noonan and Banks, 1999). The Prostaglandin act as inhibitor to sodium tubular reabsorption and ADH, decreases the secretion of aldosterone and causes glomerular vasodilation, natriasis and increased urination (Hérbert *et al*., 1993). Excess production of Prostaglandin is related to increased urination, frequency of evacuation and renal colic (Holmlund, 1983; Al-Waili, 2002). The increase of prostaglandins in glomerular glomerulonephritis and thromboxane plays an important role as an over stimulating factor in the development of chronic glomerulonephritis and microvascular lesion in patients with nephrotic syndrome, lupus nephritis and purpura nephritis (Niwa *et al*., 1987; Nakano *et al*., 1988). Thrombocyan inhibition can alleviate kidney disease (Purkerson *et al*., 1985).

Table 1: Blood biochemical parameters in the three groups (Mean ± SE).

Parameters	Groups			Level of Signi-ficance
	Control	Prostaglandin	Oxytocin	
Glucose (mg/dl)	126.10±5.39 B	126.19±5.31 B	142.77±6.43 A	*
Total protein (g/dl)	11.04±0.58 A	11.04±0.51 A	10.51±0.30 A	NS
Albumin (g/dl)	7.14±0.42 A	6.96±0.35 A	6.82±0.27 A	NS
Globulin (g/dl)	3.89±0.25 A	4.07±0.26 A	3.68±0.14 A	NS
Urea (mg/dl)	40.01±1.97 A	38.34±1.20 B	40.62±0.90 A	*
Creatinine (mg/dl)	0.73±0.02 A	0.66±0.01 A	0.75±0.02 A	NS
Cholesterol (mg/dl)	193.90±10.82 A	185.23±11.11 C	192.30±9.29 B	*
Triglycerides (mg/dl)	203.15±16.95 B	186.80±15.44 C	211.41±11.54 A	*
HDL (mg/dl)	41.30±0.31 A	41.69±0.53 A	42.19±0.31 A	NS
LDL (mg/dl)	193.23±11.98 A	188.28±13.18 C	190.39±10.62 B	*
vLDL (mg/dl)	40.63±3.39 B	37.36±3.08 C	42.28±2.30 A	*

Means with different superscripts within each row differ significantly ($P\leq0.05$). *= $P\leq0.05$, NS= Non-significant.

The effects of different groups on cholesterol of the ewes were significant ($P\leq0.05$). It was lesser in prostaglandin and increased significantly ($P\leq0.05$) in control and oxytocin treatments. The injection of oxytocin led to increase in cholesterol level and hence increase in AST and ALT level, this is a key factor in the development of hepatic lipidosis and therefore will affect the normal functions of the liver (Greenfield *et al*.,

2000; Drackley, 2002; Iqbal *et al*., 2013). In addition, high cholesterol and increased use of peripheral tissue proteins lead to increased artificial activity of the liver leading to the development hepatic lipidosis (Xu *et al*., 1998; Ropstad *et al*., 1989; Park *et al*., 2002; Iqbal *et al*., 2013). Data presented showed that the effect of different groups on Triglycerides was significant ($P<0.05$). The highest ($P<0.05$) concentration of the Triglycerides was recorded in group oxytocin (211.41 ± 11.54 mg/dl) and lowest ($P<0.05$) value in groups control and prostaglandin (203.15 ± 16.95 and 186.80 ± 15.44 mg/dl).

Adrenocorticotropic hormone liberate cortisol from adrenal gland and that led to increases the mobilization of level of free fatty acids in the blood plasma (Guyton and Hall, 2006). The mobilization of fatty acids led to raise the amount of triglyceride concentration during higher metabolic demand at peak feeding of lactation or it may caused by injection of oxytocin which led to raise the amount of non-esterified fatty acids (NEFA). The synthesis of triglycerides in liver is due to non-esterified fatty acids taken by liver (Mazur *et al*., 1992; Cebra *et al*., 1997). The β oxidation of lipids from body fats might be due to high level of thyroid hormone through stimulation of catecholamine as mentioned earlier in present study (Bilezikian and Loeb, 1983). In addition, the main function in this respect for cortisol is to lower synthesis of proteins and increase catabolism of cell proteins (Guyton and Hall, 2006). The end product of the catabolism of cell protein is production of amino acids which is used for mammary gland metabolism. Therefore the increase of protein level is due to indirect effect of Adrenocorticotropic Hormone (Vandehaar *et al*., 1999; Castillo *et al*., 2005). The LDL indices lowered in prostaglandin group (188.28 ± 13.18 mg/dl) and, increase in control group (193.23 ± 11.98 mg/dl) and oxytocin group (190.39 ± 10.62 mg/dl). The increase in LDL in the ewes injected by oxytocin resulted in raise in insulin secretion and motivate lipogenesis as indicated earlier (Hanif *et al*., 1982). The results showed that the indirect effect of oxytocin enhance the peripheral through milking and lactation (Hanif *et al*., 1982). The rise of liver formation of lipoproteins, in addition to the decomposition of stored fat as a result of the release of glucagon stimulated by oxytocin cause this increase (Bjorkstrand *et al*., 1996; Cavestany *et al*., 2005). The highest vLDL levels was recorded in oxytocin group (42.28 ± 2.30 mg/dl) and control group (40.63 ± 3.39 mg/dl) and decreased in prostaglandin group (37.36 ± 3.08 mg/dl). The low vLDL produced fatty acid composition of n-3, as indicated by most studies, may be due to cholesterol esterification or low triglyceride synthesis or apo B. Other causes are impaired vLDL formation where n-3 fatty acids can be metabolized through some prostanoids or directly. The inhibition of prostaglandin formation by the reversal effect of n-3 fatty acid suggest that n-3 fatty acid extent their effect via prostaglandins which is produced by liver cells (Anil *et al*., 1997).

In addition, the high synthesis and oxidation of low-density lipoprotein in the liver led to an higher in blood cholesterol levels LDL (Mazur *et al*., 1992; Thompson *et al*., 1996; Costantini *et al*., 1998). Beside the second function of vLDL is its role in the synthesis of milk fat in the udder glands (Grummer, 1993).

We conclude from finding of this study that the effect of injection with prostaglandin and oxytocin was eminent in increasing or decreasing of some biochemical parameters and has no significant effect on the rest of other data such as total protein, Albumin, Globulin, Creatinine and HDL.

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