

Investigation of Right and Left Ovary's Size and Weight and Comparison of Serums Concentration of Glucose, Urea and Cholesterol and Different Sized Follicles Fluid in Hybrid Cow in Khuzestan Province

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Abstract- The main prerequisite to improve fertility and reproduction status in cow, is to get sufficient knowledge on their ovary. Ovaries follicular functions play fundamental role in reproduction cycle, ovulation and conception. The main objective for the present study is to evaluate right / left ovaries size and weight and at the same time to compare concentrations of ovary glucose, urea and follicular fluid cholesterol in different sized follicles and hybrid cows serum. Serum and ovaries taken from twenty slaughtered cows were studied. Caliper was used to measure length, width and thickness of right and left ovaries. Follicular fluid was extracted from three small (3 to 5 mm), medium (6 to 9 mm) and large (up to 10 mm). Weight and length of right ovary was significantly much than those for left one ($P<0.05$), however width and thickness of right ovary did not differed from those in left one significantly. Concentrations of cholesterol, glucose and urea in follicular fluids as well as serum were determined. Results showed that concentrations of cholesterol, glucose and urea in serum ($P<0.05$) was much more than those in large, medium and small follicles significantly. Large follicles exhibited higher glucose concentration ($P<0.05$) than medium and small follicles, however, small and medium follicles did not varied significantly. As follicle size increased, urea level was declined accordingly. Small follicles showed much cholesterol concentration ($P<0.05$) than that in large and medium ones, however large and medium follicles did not varied significantly. As a whole, results revealed that weight and size of right and left ovaries vary in studied cows in this study, right ovaries were more active than left ones. Within a given biochemical medium, ovary's follicles are developed and matured, suggesting that it is associated to serum glucose variation. As follicles enlarged, urea and cholesterol levels were declined significantly.

Keywords- ovary weight, ovary size, glucose, urea, cholesterol, follicular fluid, serum

I. INTRODUCTION

To improve fertility and reproduction status in cow, entail for enough knowledge on ovary. Ovaries are surrounded by peritoneum and seem rough due to presence of follicles and corpus luteum in different reproduction cycles. Right and left ovaries vary in size and weight according to age and breed. Basically, ovary's size and weight depends on fetus placement cycle [4].

Ovary follicular functions play vital role in controlling reproduction, ovulation and conception cycles. During flocculation, granulose cells are secreted into follicular fluid [10]. Follicular fluid reflects biochemical and harmonic functions in different sized follicles (Edwards 1974). There have been wide varieties of studies in literatures, reporting that as follicles enlarge, their metabolic functions and biochemical compositions vary simultaneously [23, 13, 15] given that part of follicular fluid compositions stems from blood serum, hence, follicle growth and mature and subsequently ovulation are affected by bloods metabolite concentration [15]. Glucose, cholesterol and urea are found to be important bloods metabolites affecting animal fertility [6]. glucose has substantial contribution in ovary's metabolism functions as a main energy source [11, 4]. When follicle oocyte subjects to higher urea concentration, blastocyst formation is interrupted [7]. So follicular fluid contains growth factors, hormones and different nutrients for oocytes development and maturation. Cholesterol plays substantial role in ovary physiology and used as procure for synthesise steroidal hormones [3]. As a result, different sized follicles represent wide varieties of biochemical substances. The present study attempts to evaluate right and left ovary's size/weight and to compare serums concentration of glucose, urea and cholesterol and different sized follicles.

II. MATERIALS AND METHODS

Blood serum samples were taken from twenty non-pregnant females and healthy cows immediately before slaughtering in Ahvaz slaughterhouse, and then serum samples were poured into anti-coagulating free labeled tubes. Right and left ovaries were separated carefully and immediately were transported into laboratory of agriculture department in Ramin university inside labeled falcons along with serum samples under temperature $-4\text{ }^{\circ}\text{C}$ having been centrifuged in 3000 cycles/s for fifteen minutes, serum was isolated and kept at $-20\text{ }^{\circ}\text{C}$. After removing tissues surrounding ovary, both right and left ovaries were weighted by analytical balance (Shahin, model 700) with 0.1 precision and their length, width and thickness were measured using clipper. Then, follicles within both ovaries were classified into three classes of small (3-5 mm), medium (6 to 9 mm) and large (10 mm) [24]. In both follicles, follicular fluid was collected separately by insulin syringe and placed into labeled micro tubes. Serum and follicular fluid samples were transported into Ahvaz Jihad university laboratory. Concentrations of follicular fluid metabolites and serum were determined as per enzymatic and calorimetric method for single point measurement according to photometric approach. Data obtained on sample analysis were analyzed by software SAS 9.2, one-way ANOVA and Duncan mean separation test.

III. RESULTS AND DISCUSSION

In the present study, cholesterol, glucose and urea levels among three small, medium and large follicular groups and follicular fluid to serum (Table I) as well as right and left ovaries size and weight (Table II) were compared. Concentrations of serums glucose, urea and cholesterol was significantly much than ($P<0.05$) those in large, medium and small follicles. Large follicles glucose level was much than that in medium and small ones but it was not varied between medium and small follicles. The larger follicle size, the less urea concentration. There was no significant difference among different sized follicles in urea levels. Small follicles had less cholesterol level ($p<0.05$) than that in medium and large ones, however it was not case for large and medium ones (Table I).

Right ovary's weight and length was significantly ($p<0.05$) higher than those for left one. But width and thickness of right ovary did not differ from those for left ones (Table II). In addition, the present research showed that right and left ovaries accounting for 70% and 30% corpus luteum respectively.

Some hormones and metabolites stemmed from follicular fluid, are shown to be determinant factors for oocyte maturity and fertility [11]. Metabolically variations in serum may affect biochemical substances in follicular fluids directly and developing oocyte quality indirectly among others [6]. Follicular fluid is mainly secreted by marginal plasma, permeates across follicles membrane, accumulating in follicles internal cavity. In fact, it is a leaked serum whose composition has changed under follicle metabolically functions [23].

Glucose serves as one of the main biochemical metabolites affecting oocytes growth and development, varied significantly during follicle development [3]. In line with findings of the present research, Landau et al (2000), Leroy et al (2004), Chang et al (1976), Tabatabaei et al (2010) Thakur et al (2003) while studying on dairy cow and goat, showed that as follicle size got enlarged, glucose concentration was increased [21, 6, 19, 23, 18]. Simultaneous increases in glucose levels and follicles size might be due to increased follicular fluid secretion within dominant follicles [15]. It is likely that larger follicles have less glucose metabolism (per follicular fluid volume) than small ones, in turn results in less uptake of follicular fluid glucose by granulosa cells [6]. Etgen et al 2006 reported that less glucose synthesizes even at presence of higher growth hormone, causes less IGF-1 synthesizes. Taylor et al 2006, pointed out that declined glucose level acts through inducing less transcription. As a result, IGF-1 transcription is controlled by glucose level [25].

Higher urea concentration affects developing oocytes quality so that too urea levels in follicular fluid interrupts blastocyst formation, lowers PH in reproduction system tissues, making womb and uterus tube unsuitable for fetus [6]. Low urea concentration leads to desirable oocytes development as follicles diameter enlarges [22]. Results of the present study was confirmed by findings of Leroy et al (2004) and Nandi et al (2007) they measured various urea concentrations in different sized follicles and concluded that as follicles enlarged, urea concentration was decreased accordingly [6, 22].

In respect to results obtained from the present study, serum cholesterol concentration was varied significantly ($p<0.05$) among triple follicular groups as previously it was verified by Arshad et al 2005 and Leroy et al 2004. [3, 6] Cholesterol plays a vital role in ovary physiology and used as procure for synthesizing steroidal hormones [3]. Cholesterol in follicular fluid is found as banded with high density lipoproteins (HDL), since other large lipoproteins (LDL) cannot pass through follicular membrane [17]. According to findings of Tabatabaei et al (2010) in dairy cows and Thangavel and Nayeem (2004) in buffalo, the larger follicles, the less cholesterol concentration [24, 1].

Approximately, larger ovary's length, width and thickness are 3.5, 3 and 2.8 cm and small one ranges 2, 1.5 and 1.2 cm respectively. During fetus placement, ovaries vary in size. In addition, right ovary is more functionalized than left one [5].

Cow's ovaries range 1.5 to 5 cm in length and 1 to 3 cm in diameter, depending on reproduction cycle. Furthermore, ovary's structure (form) is not fixed and their morphology is changing consistently associated to follicles development cycle, follicle degradation, ovulation, corpus luteum enlargement and disappearing [2].

Sharuz et al 2011, while investigating in Azerbaijan buffalo recorded right and left ovaries length, width and thickness about 2, 1.32, 1.14 and 2.04, 1.31, 1.1 cm respectively and at the same time, right and left ovaries weight were 3.59 and 2.89 g respectively.

Another study conducted on horse showed that its ovaries weight ranged 4 to 8 g, and its ovary's width and length were ranged 2.4 to 4 and 5 to 8 cm respectively [20]. Ovary's weight in dog is shown to be 1.25 g and its thickness, width and length were recorded as 0.5, 0.7 and 1.5 cm [16].

Generally, results from the present study and comparing them to others researchers findings indicated that different studied cows vary in right and left ovary size and weight and right ovary in them was much active than left one. Within a biochemical medium, ovary's follicles are developed and matured under serum glucose levels variation. Additionally, as follicle getting enlarged, urea and cholesterol levels are declined sharply.

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TABLE I. AVERAGE BIOCHEMICAL COMPOSITIONS CONCENTRATION IN DIFFERENT SIZED FOLLICLES AND SERUM OF HYBRIDIZED COW IN KHUZESTAN

serum	Large follicles (up to 10 mm)	Medium follicle (6 to 9 mm)	Small follicle (3 to 5 mm)	Biochemical composition
98/62±7/3a	88/62±7/3b	63/82±5/9 c	58/82±4/16 c	glucose (mg/dl)
25/68±5/38a	14/98±1/09b	16/72±2/23 b	18/42±3/2 b	Urea (mg/dl)
91/67±7/2 a	40/57±4/3 b	42/3±5/2 b	60/42±3/2 c	Cholesterol (mg/dl)

*different letters in each row represent significant difference in probability level of 0.05

TABLE II - AVERAGE WEIGHT (GRAM) AND LENGTH, WIDTH AND THICKNESS (CM) OF RIGHT AND LEFT OVARIES IN HYBRIDIZED COW

Weight(g)	Length(cm)	Width(cm)	Thickness(cm)	parameters
8/54 ±0/96 a	3/04 ±0 /10 a	2/03 ±0/37	1/57 ± 0/26	Right ovary
5/26 ±0/83 b	2/84 ±0/29 b	1/89 ± 0/67	1/49 ±0/07	Left ovary

*different letters in each row represent significant difference in probability level of 0.05.