Enzymatic and non-enzymatic antioxidants of the jenny's preovulatory follicular fluid

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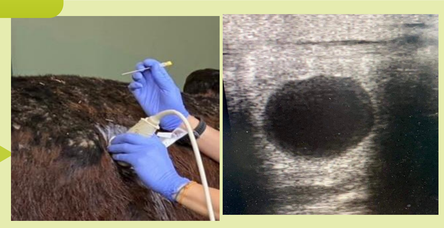
Introduction

- The follicular fluid, a transudate from the theca and granulosa cells, is fundamental for oocyte development and maturation and can improve the results of *in vitro* fertilization techniques when it is used to supplement the maturation media.
- The composition of the follicular fluid includes a wide range of molecules, among which are antioxidants. These are essential to counteract the effects of free oxygen radicals and improve oocyte quality.
- These antioxidants may also have a beneficial effect on sperm in the oviducts, by improving chromatin quality and DNA integrity through the reduction of oxidative stress.
- Antioxidants are classified in two types: enzymatic (superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPX) and paraoxonase 1 (PON1) and non-enzymatic (measured in terms of total thiol, cupric reducing antioxidant activity (CUPRAC), ferric reducing antioxidant power assay (FRAP) and Trolox equivalent antioxidant capacity (TEAC).

Objective

The aim of the present study is to describe for the first time the antioxidant profile of the preovulatory follicular fluid (PFF) of the jenny

Materials and methods



Echo-guided flank aspiration of PFF from 10 follicles

Analysis of antioxidants

- Follicles ≥ 44mm (n=4)
- Follicles < 44mm (n=6)

- Age ≥ 5 years old (n=4)
- Age < 5 years old (n=6)

Statistical analysis

Results and discussion

Table 1: Mean ± Standard error of the mean (SEM) and range of antioxidants concentrations

Enzymatic antioxidants	Mean ± SEM	Range (maximum – minimum)
SOD (UI/mL)	0,488 ± 0,024	0,580 – 0.310
GPX (UI/L)	267,430 ± 45,050	550,800 – 79,600
PON1 (UI/L)	1,569 ± 0,080	2,098 – 1,238
CAT (UI/mL)	0,300 ± 0,021	0,458 – 0,229
Non-enzymatic antioxidants	**Mean ± SEM**	**Range (maximum – minimum)**
CUPRAC (mmol/L)	0,479 ± 0,010	0,555 – 0,452
FRAP (mmol/L)	0,342 ± 0,012	0,417 – 0,287
TEAC (mmol/L)	0,631 ± 0,017	0,766 – 0,565
Thiol (µmol/L)	303,180 ± 10,043	383,200 – 275,300

Table 2: Mean ± SEM and p-value (t-test), comparison by jennies' age

Enzymatic antioxidants	Jennies > 5 years old Mean ± SEM	Jennies < 5 years old Mean ± SEM	p-value
SOD (UI/mL)	0,433 ± 0,043	0,525 ± 0,017	0,05097
GPX (UI/L)	308,950 ± 110,151	239,750 ± 29,189	0,4845
PON1 (UI/L)	1,805 ± 0,100	1,413 ± 0,056	0,006052 *
CAT (UI/mL)	0,318 ± 0,050	0,288 ±0,017	0,5274
Non enzymatic antioxidants			
CUPRAC (mmol/L)	0,504 ± 0,021	0,463 ± 0,004	0,03964 *
FRAP (mmol/L)	0,370 ± 0,016	0,324 ± 0,013	0,05377
TEAC (mmol/L)	0,656 ± 0,038	0,615 ± 0,013	0,259
Thiol (µmol/L)	320,125 ± 24,101	291,883 ± 2,534	0,1818

Table 3: Mean ± SEM and p-value (t-test), comparison by follicular size

Enzymatic antioxidants	Follicles ≥ 44 mm Mean ± SEM	Follicles < 44 mm Mean ± SEM	p-value
SOD (UI/mL)	0,490 ± 0,022	0,487 ± 0,039	0,9504
GPX (UI/L)	292,550 ± 105,052	250,683 ± 39,164	0,6756
PON1 (UI/L)	1,768 ± 0,111	1,438 ± 0,076	0,034 *
CAT (UI/mL)	0,298 ± 0,053	0,302 ± 0,015	0,9347
Non-enzymatic antioxidants			
CUPRAC (mmol/L)	0,488 ± 0,023	0,473 ± 0,010	0,504
FRAP (mmol/L)	0,363 ± 0,021	0,328 ± 0,013	0,1773
TEAC (mmol/L)	0,661 ± 0,031	0,611 ± 0,0116	0,164
Thiol (µmol/L)	309,675 ± 24,757	298,850 ± 6,931	0,6267

Conclusion

The present study provides new information about the enzymatic and non-enzymatic antioxidant profile of PFF. Follicular fluid antioxidants play a key role in the development, maturation, and fertility of oocytes; therefore, the activity levels observed in this study could be considered in the formulation of new *in vitro* maturation media for donkey oocytes.