

Characterization of morphological abnormalities from semen samples obtained at Fundació Hospital Clínic Veterinari UAB



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INTRODUCTION

There are several factors that can affect sperm morphology, such as dog's age, since morphological abnormalities increase with increasing age. Nevertheless, no differences have been found between stations regarding sperm morphology.

OBJECTIVES

- Identify and quantify the main morphological abnormalities.
- Determine the incidence of each abnormality related to age.
- Relate the influence of the season on the sperm morphology and quantify it.

MATERIAL AND METHODS

Seminal samples of 185 dogs of 44 different breeds are considered. Through manual stimulation, the second and third fractions of the ejaculate are collected. The sperm morphology and the acrosome status of each sample are evaluated with optical microscope x1000 using eosin-nigrosin staining. 200 spermatozoa are evaluated for each sample. The statistical analysis is carried out with R software (versions 3.5.3, 2019). The logistic regression model is used and the values are considered statistically significant when $p < 0,05$.

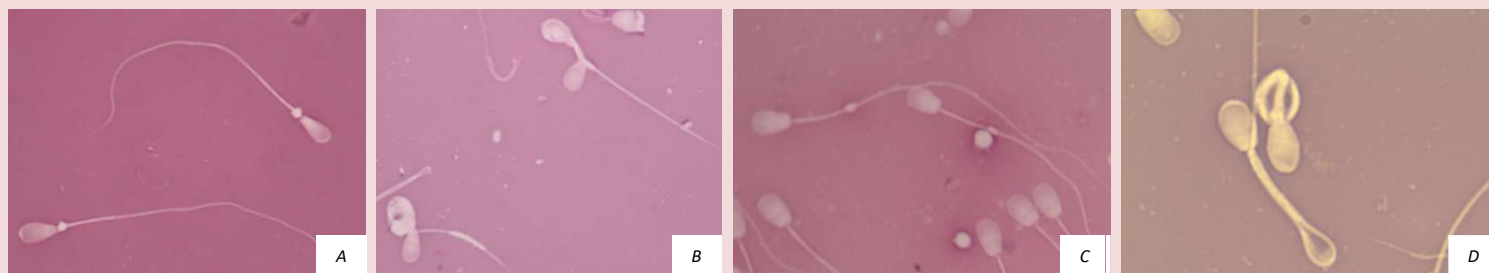


Figure 1. Morphological abnormalities examples in canine spermatozoa (eosin-nigrosin staining, x1000). A, piriform head and proximal cytoplasmic droplet. B, midpiece defect. C, distal cytoplasmic droplet. D, coiled tail and bent tail.

RESULTS AND DISCUSSION

The most frequent are acrosome defects, but it can't be considered as a morphological abnormality due to the fact that great part of dead spermatozoa present it, so the most frequent abnormality is proximal cytoplasmic droplet. Therefore, the average total morphological abnormalities is 45,55%.

Table 1. Number of dogs in each group of the study

Parameter	Number of samples
Age	
Young (<2 years)	37
Adult (2–7 years)	129
Old (>7 years)	19
Season	
Spring (21/03–20/06)	51
Summer (21/06–22/09)	43
Autumn (23/09–20/12)	35
Winter (21/12–20/03)	56

Table 2. Average, correlation (z) and p-values (p) between morphological abnormalities and age.

	Age			Statistical significance
	Young	Adult	Old	
	Average (%)	Average (%)	Average (%)	
Total abnormalities	35,85	45,39	55,14	$z = 0,000$ $p = 1,000$
Acrosome defects	25,67	21,17	22,48	$z = 0,000$ $p = 1,000$
Head defects	3,86	3,88	6,75	$z = 0,000$ $p = 1,000$
Neck and midpiece defects	10,29	8,14	7,11	$z = 0,000$ $p = 1,000$
Bent tails	4,26	6,41	4,95	$z = 0,000$ $p = 1,000$
Coiled tails	3,50	3,82	7,24	$z = 0,000$ $p = 1,000$
Proximal cytoplasmic droplet	6,39	14,90	26,98	$z = 0,000$ $p = 1,000$
Distal cytoplasmic droplet	7,76	7,68	4,87	$z = 0,000$ $p = 1,000$
Distal midpiece reflex	0,06	1,29	1,35	$z = 0,000$ $p = 1,000$

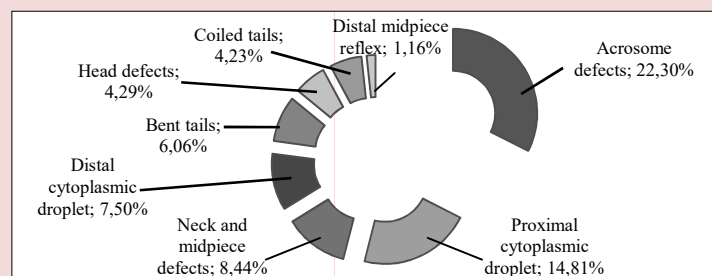


Figure 2. Percentage of morphological abnormalities of total evaluated spermatozoa.

Table 3. Average, correlation (z) and p-values (p) between morphological abnormalities and season.

	Season				Statistical significance
	Spring	Summer	Autumn	Winter	
	Average (%)	Average (%)	Average (%)	Average (%)	
Total abnormalities	42,69	53,73	40,23	41,68	$z = 0,000$ $p = 1,000$
Acrosome defects	23,80	25,13	20,14	19,80	$z = 0,000$ $p = 1,000$
Head defects	3,59	5,12	3,87	4,17	$z = 0,000$ $p = 1,000$
Neck and midpiece defects	6,83	8,62	8,50	9,82	$z = 0,000$ $p = 1,000$
Bent tails	3,92	6,45	8,24	5,58	$z = 0,000$ $p = 1,000$
Coiled tails	4,23	5,24	3,18	3,70	$z = 0,000$ $p = 1,000$
Proximal cytoplasmic droplet	15,94	16,73	15,04	10,94	$z = 0,000$ $p = 1,000$
Distal cytoplasmic droplet	7,11	9,59	4,94	7,48	$z = 0,000$ $p = 1,000$
Distal midpiece reflex	1,02	1,66	0,80	1,11	$z = 0,000$ $p = 1,000$

CONCLUSIONS

- Without considering the acrosome defects, the most frequent morphological abnormality is proximal cytoplasmic droplet (14,81%) and, in second place, neck and midpiece defects (8,44%).
- About animal's age, no significant differences have been found in the incidence of the morphological abnormalities.
- Neither seasonal effect has been found regarding sperm morphology.