Taurine Affect the Quality of Stallion Spermatozoa – a Review

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Abstract

Considering that spermatozoa are very sensitive cells, research of conservation media with different natural substances is very important area for many research institutions. Preservation media help to keep fertility ability of spermatozoa after long hours of storage and transport. In order to be able to use suitable natural substances as a conservation medium and successfully implement fertilization of a selected mare is necessary to ensure a thorough evaluation of spermatozoa. One of the most important evaluated parameters of stallion ejaculate quality is sperm concentration, motility and morphology. Commonly used methods for assessment of spermatozoa parameters are CASA system (Computer Assisted Semen Analysis) and mitochondrial toxicity test (MTT). This review summarises effect of taurine on stallion spermatozoa during storage and transport, especially in the development of potential parts conservation mediums.

Keywords: stallion, spermatozoa, quality, CASA, MTT, natural substances

1. Introduction

Today, it is common for breeding stallions to have offspring all over the world, mares have tens of foals born, or clones of successful horses meet at a sporting event. In our conditions, the use of frozen semen or the distribution of chilled semen is a common part of advanced breeders [1].

Considering that, spermatozoa are very sensitive cells, conservation media research is an important area for many research aspects. Preservation media help the spermatozoa to be used more efficiently even after long hours of storage and transport. In order to be able to use a suitable preservative medium and successfully implement the fertilization of a selected mare, thorough evaluation of spermatozoa must be ensured. This evaluation is an essential component of semen analysis and provides invaluable clinical information for assessing the breeding reliability of stallions and the potential fertility of individual semen samples [2, 3].

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2. Effects of using natural substances on stallion spermatozoa *in vitro*

2.1. Taurine

Taurine is a sulfur-containing organic 2-aminoethane sulfonic acid. Its cytoprotective properties are based on the ability of detoxification, osmoregulation, membrane stabilization and calcium homeostasis [4]. It is highly contained in many tissues and is also

synthesized by many tissues such as e.g. central nervous system, liver, kidneys, retina and mammary gland [5]. In addition, taurine was also detected in the male reproductive system such as e.g. in Leydig cells, in interstitial testicular cells [6]. The use of taurine in reproduction is based on the ability to maintain spermatozoa motility and is also involved in spermatozoa capacitation. It is also defined as a cryoprotectant that minimizes cell damage [7, 8]. Studies by several authors [9, 10] report that taurine and hypotaurine were found in mammalian spermatozoa and seminal plasma and have also been shown to have a positive effect on spermatozoa motility, aiding spermatozoa capacity and also improving fertilization success.

Several studies were conducted on equine and other mammalian cooled and frozen semen with addition of taurine [8, 11-14]. The addition of antioxidants such as taurine to ram and rabbit spermatozoa demonstrated the protective effect of spermatozoa against the harmful effects of reactive oxygen species (ROS) and positively improved spermatozoa motility and membrane integrity over a longer period of cultivation [15, 16]. The effect of taurine on the quality parameters of turkey sperm (*Meleagris gallopavo*), during storage at 5° C and 41° C, was performed [5]. The ejaculate was diluted in saline with the addition of 0.078125; 0.15625; 0.3125; 0.625; 1.25; 2.5; 5, 7.5 and 10 taurine mg/ml. The addition of taurine at a concentration of 10 mg/ml had a significant negative impact on the quality parameters of spermatozoa at 0 and 1 hour of incubation. In contrast, a positive effect of taurine was observed at concentrations of 2.5; 5 and 7.5 mg/ml, when significantly higher values of selected motility parameters were recorded compared to the control.

Results of Ijaz et al. [11] confirmed positive effect of taurine added to different semen extenders on spermatozoa motility and longevity during 5°C incubation. However, opposite effect of taurine was observed on post-thaw equine frozen semen [12]. In research conducted by [17] the effect of taurine with a concentration of 7.5 mg/ml, during 5°C cultivation slightly helps to prolong the viability of spermatozoa during a longer period of cultivation and thus the reproductive qualities of breeding stallions. The use of taurine addition maintains the increased viability of spermatozoa in the insemination dose of stallions, which are distributed to the breeders.

Conclusions

Taurine can be a valuable and effective component of semen extenders with a positive effect on maintaining of stallion spermatozoa during transport of insemination doses. The results show that taurine not only has ability to improve spermatozoa motility but can also protect spermatozoa against negative effect of reactive oxygen species.

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