Relationships between Seminal Fluid Sex Steroids and Milt Quality of Russian Sturgeon, *Acipenser gueldenstaedtii*, Brandt & Ratzeburg, 1833

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Abstract

The present study was conducted to understand the role of seminal fluid sex steroids on sperm quality parameters after final spermatozoa maturation. In this respect the sperm motility, sperm production and also seminal fluid sex steroids including testosterone (T) and estradiol-17b (E2), progesterone (P) and 17a-Hydroxyprogesterone (OHP) were measured after sperm ejaculation. According to results, the levels of OHP showed a close positive correlation with percentage and duration of sperm motility and also between T and E2 with sperm concentration. Our results revealed that some seminal fluid sex steroids could be considered as milt quality biomarkers in Russian sturgeon.

Keywords: seminal fluid, sex steroids, sperm motility, Russian sturgeon

Introduction

The secretion of seminal fluid and acquisition of motility potential is major event during the final maturation of fish spermatozoa (Morisawa and Morisawa, 1986, 1988; Nagahama, 1994). The seminal fluid composition have been analysed for many fish species in order to detection of milt quality biomarkers, physiological roles and other purposes [5, 6, 8]. Russian sturgeon, A. gueldenstaedti has a wide distribution, occurring in the Caspian Sea, Black Sea and the Sea of Azov, and originally in many of the tributaries of these seas (IUCN 2010). Unfortunately, the Russian sturgeon populations in nature is seriously declining due to the overfishing and environmental destruction so that this species has been considered as critically endangered by IUCN (2010). The present study aimed to determination of seminal fluid levels of steroids and their relationships with milt quality parameters in Russian sturgeon.

Materials and methods

During the spawning season from March to June, teen spermiating Russian sturgeon males (TL= 134.3 ± 8.1 cm, weight = 24.2 ± 2.1 kg) were considered for
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experiment in Shahid Beheshti Artificial Sturgeon Propagation and Rearing Center (SBAPRC), Iran, Rasht. The milt samples were collected using special syringe. Sperm density was measured by haemocytometer counting chamber [1]. Sperm motility as percentage and duration of sperm motility was estimated by a semi-quantitative method. Steroid assays was conducted according to Hajirezaee et al. (2011) [3] using IMMUNOTECH assay kits. The SPSS software was used for data analysis.

Results

In our study, significant positive relationship was found between OHP levels and percentage (y = 13.97x+66.62; r² = 0.81) and duration (y = 87.53x+284.2; r² = 0.78) of motility (P<0.05), although such relationships were not observed for P (P>0.05). As well as, significant positive correlations (P<0.05) were observed between E2 (y = 0.082x+0.51; r² = 0.74) and T (y = 0.59x+5.7; r² = 0.69) with sperm density. There was no relationship between P levels and sperm density (P>0.05).

Discussion

Sex steroids are organic components, which have key role in hormonal control of the reproduction in fish [4]. In our study, various concentrations of sex steroids were detected in seminal fluid of the Russian sturgeon. The main source of seminal fluid steroids may be blood, although studies have demonstrated the urine contamination as additional origin [9]. Such contamination could decreases sperm motility before sperm ejaculation [2; 7]. In Russian sturgeon, the good relationships between seminal fluid T and E2 sperm production and also OHP levels and sperm motility indicate that the seminal fluid levels of T, E2 and OHP could be considered as milt quality biomarkers. In the males of teleosts, T has been identified to be the main steroids involved in spermatogenesis and initiation of spermiation [10]. As well as, some studies have discussed about the role of E2 in the spermatogenesis, although the E2 is considered mostly as a vitellogenic hormone. In Russian sturgeon, the close positive correlation of seminal fluid T and E2 with sperm density may be in relation to important their roles on sperm production.
References


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