

The Potential of *Nigella sativa* and Thymoquinone in Salvaging the Embryo from Effects of Toxic Paternal Exposure

Nadia Hanis Abdul Samat, Suzanah Abdul Rahman*, Nur Amalina Ahmad, 'Afif Raihan Abdullah, Syazana Mohamad Zahri

Department of Biomedical Science, Kulliyyah of Allied Health Sciences, International Islamic University Malaysia

ABSTRACT

Objectives/Research Problem: Studies have reported that exposure to the alkylating drug, cyclophosphamide (CPA), for cancer treatment results in adverse reproductive consequences. Overproduction of reactive oxygen species causes oxidative stress thus affecting the DNA in male germ cell inducing sperm defects. Our goal is to assess the potential of *Nigella sativa* extract (NSE) and thymoquinone (TQ) in the enhancement of sperm and embryo quality following exposure to the damaging effects of the anticancer drug.

Materials and Method: Thirty male ICR mice were divided into six groups; Group 1: Vehicle-treated control (normal saline), Group 2: CPA-only, Group 3: TQ-only, Group 4: NSE-only, Group 5: CPA followed by TQ and Group 6: CPA followed by NSE. CPA is a one-time administration at a dose of 200 mg/kg via intraperitoneal injection. Both NSE and TQ were administered at 10 mg/kg on alternate days either on their own or in the combination with CPA. Animals were sacrificed at 33 days by cervical dislocation and sperm from caudal epididymis were taken for analysis, followed by in vitro fertilization (IVF) with the eggs from untreated female ICR mice. Fertilization rates and embryo development were assessed and monitored for 5 days.

Results and Discussion: Results showed that NSE and TQ supplementation to CPA-exposed male mice have no significant effect ($p>0.05$) on the total number of sperm. NSE and TQ supplementation have been shown to have significant effect ($p<0.05$) on the percentage of motile sperm as well as the number of abnormal sperm. Four types of abnormalities of the sperm were found which include folded sperm, amorphous, banana-like and the lack of usual hook. Embryo quality showed a significant improvement following supplementation of TQ and NSE ($p<0.05$).

Conclusion: Overall, both NSE and TQ have indicated chemo-preventive potential against the cytotoxicity of CPA on reproductive capacity and fertility in mice.

KEYWORDS: *Nigella sativa*, Thymoquinone, Cyclophosphamide, In Vitro Fertilization, Embryo Grading.

*CORRESPONDENCE: arsuzanah@iium.edu.my