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Extended Abstract

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The effects of acrylamide and Vitamin E administration during pregnancy on adult rat ovary tissues

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To investigate changes in adult female rat ovary tissue following acrylamide (AA) and vitamin E administration during pregnancy. The present study was conducted with the approval of the experimental animals ethics committee at Inonu University, Faculty of Medicine (2017 / A-11). Thirty rats, confirmed to be pregnant with vaginal smear, were divided into 5 different groups that included equal number of pregnant rats: Control, Corn oil, Vitamin E, Acrylamide, Vitamin E + Acrylamide Groups. The birth was monitored on the 21st day of gestation and female rats were selected and at the end of 8 weeks, the rats were decapitated. Rat ovary tissues were examined for malondialdehyde (MDA), reduced glutathione (GSH), total antioxidant status (TAS), total oxidant status (TOS) and superoxide dismutase (SOD), catalase (CAT) and nitric oxide (NO) levels. It was determined that AA had a negative effect on oxidant-antioxidant parameters (MDA, GSH, NO, SOD, CAT, TAS, TOS) in the ovary tissue ($P<0.05$), whereas Vitamin E administration increased GSH, TAS, NO, SOD, CAT levels ($P<0.05$). It is unlikely to be exposed to food-borne AA toxicity and AA toxicity could lead to permanent damages. It is certain that infertility incidences are increasing among the population every day. Vitamin E is observed to have protective effects against AA toxicity, however further studies are required. Keywords: Pregnancy, acrylamide, Vitamin E, ovary, oxidative stress. Acrylamide (AA) is widely used in industry, especially in printing, textile and research laboratories. It is a toxic substance that has a high chemical activity that can be synthesized chemically and does not exist naturally. AA occurs spontaneously in the carbohydrate and protein-rich foods once these foods reach temperatures above 120 °C. The actual risk for humans is the constant exposure to food-induced AA toxicity. It was determined that AA was neurotoxic, genotoxic and carcinogenic and highly toxic for the animal reproductive systems, furthermore, it was classified as neurotoxic and 2A class carcinogenic for humans. The daily dose of AA intake was reported as 0.2-0.8 µg/kg/day in adults. Such intake varies based on factors such as lifestyle, type of nutrition and diet and age and gender. Due to easy solubility in water, AA can easily pass from placenta to fetus. Given that fetuses are in the developmental stages during intrauterine period the occurrence of a life-long, AA-induced permanent damage is possible. Researchers that investigated the effects of AA on reproductive toxicity in the reproductive tissues reported that it decreased reduced glutathione levels, increased malondialdehyde levels and led to DNA damage. It was indicated that such effects of AA shifted oxidant/antioxidant balance towards oxidants and caused oxidative stress, hence occurred infertility. Vitamin E is a powerful antioxidant that can easily pass through the placenta. It can exhibit properties that are capable of protecting the cells and tissues against oxidative stress-induced damage through increasing the antioxidant capacity against free radicals. It is a fact that infertility continues to increase every day. The present study, for the first time, investigates the effects of acrylamide and vitamin E on ovarian tissues of adult rats (8 weeks old), which were the offspring of rats administered Acrylamide (AA) and vitamin E during pregnancy. Before starting the present study, ethics approval was obtained from the experimental animal ethics committee of the Faculty of Medicine at Inonu University (2017/A-11). Thirty young female Sprague Dawley rats, which weighed 250 ± 25 grams and were produced at the Experimental Animal Production and Research Center of the Faculty of Medicine at Inonu University (INUTF-DEHUM), were used in the present study. One male and two female rats were taken into special cages at 5 PM. The rats were kept in the cages until 8 AM the next morning. At the end of this period, the male rats were separated from the female rats. Vaginal smears were taken from the female rats, examined under a microscope, and the rats with sperm in their smear were accepted as half-day pregnant. The rats, without positively confirmed pregnancies through the smear test, were excluded from the study. The pregnant rats were kept at 21 ± 2ºC rooms at the INUTF-DEHUM for 20 days (pregnancy period) in a ventilated and 12 hours light and 12 hours dark environment. The rats were fed ad-libitum during the experimental period. Over tissues kept in the freezer (-80oC) were taken out and weighed on the analysis day. Phosphate buffer was added to obtain a 10% homogenate and it was homogenized in ice for 12 minutes at 12000 rpm (IKA, Germany). The supernatant were obtained through centrifuging the tissue homogenates at 5000 rpm and +4 oC for 30 minutes. The MDA analysis was conducted based on the method by Uchiyama and Mihara (16). The MDA concentration was determined through the measurement of the supernatant, extracted from the n-butanol phase of the pink colored product occurring as a result of the MDA in the supernatant reacted with thiobarbituric acid at 95 °C, by a spectrophotometer at 535 and 520 nm. The results are presented as nmol/g wet tissue.

Bottom Note: *This work is partly presented at* EuroSciCon Joint Event on Biotechnology, Stem Cell and Molecular Diagnostics
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