

Effect of nicotine on sperm of normospermic men: modulations by made antioxidants

Arabi M. (Ph.D.)¹, Anand R. (Ph.D.)².

1-Assistant Professor, Biology Department, Faculty of Sciences, Shahr Kord University, Shahr Kord, Iran.

2-Assistant Professor, Biology Department, Faculty of Zoology, Panjanb University, Chendigar, India.

Abstract

Nicotine is one of the major components of cigarette smoke, which have harmful effects like tobacco in human body. Aim of this study is to determine the effect of nicotine on sperm cells. For this purpose we studied the effect of 0.5 & 1mM of nicotine on extent of lipoperoxidation (LPO), balance between oxidized (GSSG) and reduced glutathione (GSH), glutathione S-transferase (GST) activity, and extent of DNA fragmentation with antioxidant interactions in spermatozoa of normospermic men.

Vitamin C, glutathione (GSH), and trolox (a water-soluble analog of Vitamin E) were used as antioxidants. Nicotine treatments (0.5 & 1mM) could elevate the level of thiobarbituric acid reactive substances (TBARS) by 51.50% & 78% ($P<0.01$ & $P<0.001$).

Antioxidants could diminish the TBARS level, amongst trolox was shown better result, but Vitamin C acted as a pro-oxidant when ferrous ions were added to the medium. It was found that the glutathione redox ratio (GSH/GSSG) decreased upon nicotine additions by 49.20% & 60.30% ($P<0.01$). The GST activity also was increased by about 34.01% & 57.19%, in a significant manner respectively. The comet assay results revealed that nicotine could induce severe double-stranded breaks in sperm DNA ladder. Elevated level of TBARS and decreased GSH/GSSG demonstrated a severe peroxidation on sperm membrane lipids through oxygen-derived free radicals. The upgraded activity of GST is an indicator of propagation of LPO in sperm. Collectively, these changes are able to cause inactivation in sperm leading to infertility.

Keywords: Sperm, Nicotine, Free radical, Antioxidant, Glutathione-S-Transferase, Lipid peroxidation and Comet assay.

Corresponding address: Dr. Arabi M., Biology Department, Faculty of Sciences, Shahr Kord University, P.O. Box: 115, Shahr Kord, Iran.

Email: mehranarabi@yahoo.com