Elshal, M.F., El-Sayed, I.H., Elsaied, M.A., El-Masry, S.A., Kumosani, T.A.

Sperm head defects and disturbances in spermatozoal chromatin and DNA integrities in idiopathic infertile subjects: Association with cigarette smoking

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[a] Molecular Biology Department, Genetic Engineering and Biotechnology Research Institute (GEBRI), Menoufiya University, Egypt
[b] Dermatology, Andrology and STDs Department, Mansoura University, Egypt
[c] Biochemistry Department, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia

Abstract
Objectives: To evaluate sperm chromatin and DNA integrities in idiopathic infertile men and determine the possible association(s) of cigarette smoking on oxidative stress markers, antioxidant capacity and semen quality. Subjects and methods: Semen samples from men referring to the andrology laboratory were categorized into 3 groups: fertile non-smokers (n = 16), infertile non-smokers (n = 36), and infertile smokers (n = 34). Semen analysis was performed according to WHO criteria. The percentage of sperm DNA fragmentation index (%DFI) and the percentage of sperm with abnormally high DNA stainability (HDS%; immature spermatozoa) were determined by SCSA using the metachromatic properties of acridine orange. Lipid peroxidation, superoxide dismutase (SOD), catalase (CAT) and reduced glutathione (GSH) levels in seminal plasma and spermatozoa were measured by spectrophotometric assays. Results: The classical semen parameters were negatively correlated with lipid peroxidation in spermatozoa; motility and morphology were negatively correlated with %DFI ($p < 0.05$). HDS% was also negatively correlated with above markers except for morphology ($r = -0.352$, $p = 0.081$). DFI% and HDS% were significantly higher in the infertile smokers group than in infertile non-smokers ($p = 0.032$; $p = 0.001$ respectively). Cigarette smoking was significantly associated with DFI%, HDS%, TBARS and the fraction of "round-headed" sperm ($r = 0.796$, $p = 0.0001$; $r = 0.371$, $p = 0.033$; $r = 0.606$, $r = 0.591$, $p = 0.001$ respectively), and decreased SOD levels ($r = -0.545$). Conclusion: DFI%, HDS% and round-head sperms are increased in idiopathic infertile men; this increase is associated with cigarette smoking. These defects may be attributed to increased oxidative stress and insufficient scavenging antioxidant enzymes in the seminal fluid of infertile patients. © 2008 The Canadian Society of Clinical Chemists.

Author Keywords
Antioxidants; DFI; DNA; Flow cytometry; Free radicals; HDS; Male infertility; Oxidative stress; Smoking; Spermatozoa

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