

## Assessment of Cytogenetic Damage as a Function of Radiofrequency Electromagnetic Radiations Exposure Measured by Electric Field Strength: A Gender Based Study

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**Abstract :** Background: Dependence on electromagnetic radiations involved in communication and information technologies has incredibly increased in the personal and professional world. Among the numerous radiations, sources are fixed site transmitters, mobile phone base stations, and power lines beside indoor devices like cordless phones, WiFi, Bluetooth, TV, radio, microwave ovens, etc. Rather there is the continuous emittance of radiofrequency radiations (RFR) even to those not using the devices from mobile phone base stations. The consistent and widespread usage of wireless devices has build-up electromagnetic fields everywhere. In fact, the radiofrequency electromagnetic field (RF-EMF) has insidiously become a part of the environment and like any contaminant may pose to be health-hazardous requiring assessment. Materials and Methods: In the present study, cytogenetic damage was assessed using the Buccal Micronucleus Cytome (BMCyt) assay as a function of radiation exposure after Institutional Ethics Committee clearance of the study and written voluntary informed consent from the participants. On a pre-designed questionnaire, general information lifestyle patterns (diet, physical activity, smoking, drinking, use of mobile phones, internet, Wi-Fi usage, etc.) genetic, reproductive (pedigrees) and medical histories were recorded. For this, 24 hour-personal exposimeter measurements (PEM) were recorded for unrelated 60 healthy adults (40 cases residing in the vicinity of mobile phone base stations since their installation and 20 controls residing in areas with no base stations). The personal exposimeter collects information from all the sources generating EMF (TETRA, GSM, UMTS, DECT, and WLAN) as total RF-EMF uplink and downlink. Findings: The cases (n=40; 23-90 years) and the controls (n=20; 19-65 years) matched for alcohol drinking, smoking habits, and mobile and cordless phone usage. The PEM in cases ( $149.28 \pm 8.98$  mV/m) revealed significantly higher (p=0.000) electric field strength compared to the recorded value ( $80.40 \pm 0.30$  mV/m) in controls. The GSM 900 uplink (p=0.000), GSM 1800 downlink (p=0.000), UMTS (both uplink; p=0.013 and downlink; p=0.001) and DECT (p=0.000) electric field strength were significantly elevated in the cases as compared to controls. The electric field strength in the cases was significantly from GSM1800 ( $52.26 \pm 4.49$  mV/m) followed by GSM900 ( $45.69 \pm 4.98$  mV/m), UMTS ( $25.03 \pm 3.33$  mV/m), DECT ( $18.02 \pm 2.14$  mV/m) and was least from WLAN ( $8.26 \pm 2.35$  mV/m). The higher significantly (p=0.000) increased exposure to the cases was from GSM ( $97.96 \pm 6.97$  mV/m) in comparison to UMTS, DECT, and WLAN. The frequencies of micronuclei (1.86X, p=0.007), nuclear buds (2.95X, p=0.002) and cell death parameter (condensed chromatin cells) were significantly (1.75X, p=0.007) elevated in cases compared to that in controls probably as a function of radiofrequency radiation exposure. Conclusion: In the absence of other exposure(s), any cytogenetic damage if unrepaired is a cause of concern as it can cause malignancy. Larger sample size with the clinical assessment will prove more insightful of such an effect.

**Keywords :** Buccal micronucleus cytome assay, cytogenetic damage, electric field strength, personal exposimeter

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