different preparations of MSWSS. A dose-dependent decrease in embryonic movements was observed, which did not recover by the end of experiment. It was concluded that nicotine could alter embryonic movements, which are important during embryogenesis for differentiation and maturation of the body systems.

Key words : Nicotine, MSWSS, Chicken embryo, Embryonic movement

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Disruption of Normal Embryonic Angiogenesis by Direct Exposure of Mainstream Whole Smoke Solutions of Commercial Cigarettes

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Angiogenesis is activated in the female reproductive system during embryogenesis and embryo implantation. Smoking during pregnancy has been linked to interfere with normal process of angiogenesis resulting an increased incidence of ectopic pregnancy, spontaneous abortion, preterm delivery and sudden infant death syndrome. Chorioallantoic membrane (CAM) assay was used as an alternative in vivo approach to evaluate the toxicological effects of different mainstream whole smoke solutions (MSWSS) of commercial cigarettes on embryonic angiogenesis. Seventy 5-day-old CAMs, divided in seven groups were exposed to MSWSS with different nicotine concentration: 0.2 mg (group B), 0.3 mg (group C), 0.5 mg (group D), 0.6 mg (group E), 0.7 mg (group F) and 1mg (group G). All smoke solutions caused varying levels of disruption on the normal process of angiogenesis and have shown to adversely affect the diameters of blood vessels, capillary plexus formation and organization of the fibrillar materials of CAMs Abbot curve, angular spectrum and 3D surface roughness of CAMs were also measured for precise quantification of angiogenesis. Moderate to dramatic changes were observed in all treated groups with a very highly significant ($P < 0.001$) disruption observed on CAMs of group G. No significant change was observed in different groups treated with pure nicotine. Current observations demonstrated that MSWSS of different commercial cigarettes have toxic effects on the process of angiogenesis and smoking during pregnancy may lead to an increased risk of spontaneous abortion and preterm delivery.

Key words: Angiogenesis; MSWSS; Nicotine; CAM; Cigarette

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