Cleft Palate induced by Sulfur Mustard in mice fetus

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Sulfur Mustard (SM) is a chemical warfare agent which was widely used in the World War I and more recently during Gulf war in the early 1980s. SM is a strong alkylating agent with known mutagenic and carcinogenic effects; but only few studies have been published on its teratogenicity. Since SM has been widely used as a chemical weapon by the Iraqi regime against the Iranian soldiers as well as the civilian population particularly pregnant women in the border area; therefore, the investigation of SM adverse effects on cleft malformations which is one of the most frequent congenital anomalies is considered in this study. An experimental work has been carried out in embryopathy in mouse with intraperitoneal injection of 0.75 and 1.5 mg/kg SM at different periods of gestation. Cleft lip and palate were examined by stereomicroscopy. Current data demonstrate that exposure with SM on the 11th day of gestation can increase the incidence of cleft defects in comparison with control group (P<0.001). These results also show that SM treatment in GD 11 and 13 can lead to more anomalies compared with GD 14 (P<0.001). They also show that the teratogenic effects of SM are restrictively under the influence of the threshold dose and time of gestation. The present results suggest that exposure to sufficient doses of SM on critical days of gestation may increase the risk of congenital cleft malformations.

Keywords: Sulfur Mustard, teratogenicity, cleft lip/palate

In World War I (1914-1918), the use of chemical weapons especially mustard gas (SM) led to thousands of death (1,2,3). Without attention to the conventional laws that prohibit the use of these weapons, these agents were applied by the Iraqi Army during the Gulf war (1981-1989) which caused the deaths of many soldiers (1).

The destructive effects of SM are well recognized. The eyes, the skin, and the respiratory tract are the principal organ targets of SM toxicity (4-8). SM is highly lipophilic and is absorbed very quickly through the skin. After a latent period of 6-24 h erythema and blisters appear on the skin (6). Pulmonary complications mainly on the upper respiratory tract such as hemorrhagic inflammation, sore throat, hoarseness, cough, bronchitis, and bronchopneumonia are observed in SM-exposed victims (6,9). Additionally, lung cancers had been reported in fishermen who were exposed to SM and in workers of SM manufacturing plants (10-12). Because of its alkylating and electrophilic properties, SM can alter chemical functional groups.