Continuous exposure of three successive generations of mice to electromagnetic fi elds: implication on double minute frequency

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Abstrak

Latar belakang: Penelitian epidemiologi pada pekerja kelistrikan yang terpajan medan elektromagnet (EMF) memperlihatkan terjadi peningkatan risiko leukemia, limfoma dan tumor otak. Hasil penelitian terdahulu dengan pajanan medan elektromagnet (1-5 kV) hingga 4 generasi mencit menimbulkan kelainan morfologi dan tumor. Penelitian ini bertujuan untuk mengetahui apakah pajanan dengan medan elektromagnet terus menerus dengan tegangan 3, 4 dan 5 kV pada mencit berimplikasi terhadap rusaknya kromosom yang dideteksi sebagai pembentukan kromosom double minute.
Metode: Empat pasang mencit galur Swiss Webster umur 3-4 bulan, dipajankan terhadap EMF 3, 4, dan 5 kV, dan satu pasang diambil sebagai kontrol tanpa pajanan. Pembentukan double minute diperiksa pada semua turunan, kecuali satu pasang untuk dipajan seperti di atas untuk mendapatkan generasi F2, dan F3 . Dua puluh metafase kromosom diperiksa, dan frekuensi double minute dihitung pada tiga generasi semua kelompok.
Hasil: Frekuensi double minute pada mencit F1, F2, dan F3 yang dipajan EMF 3 kV adalah berturut-turut (0,78+0,08; 0,83+0,09; dan 0,80+0,05). Pada pajanan 4 KV (0,083+0,11; 0,73+0,03; dan 0,96+0,15), dan 5 kV (0,96+0,25; 0,75+0,05; dan 0.99+0.33), sedangkan pada kelompok kontrol tidak ditemukan. Frekuensi double minute pada mencit yang dipajan dengan EMF lebih tinggi secara bermakna dibandingkan kontrolnya.
Kesimpulan: Pajanan medan elektromagnet terus menerus dengan tegangan 3 kV, 4 kV, dan 5 kV selama tiga generasi menyebabkan peningkatan perubahan pada kromosom yang menghasilkan double minute. (Med J Indones 2011; 20:109-13).
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Abstract
Background: Epidemiological studies indicate increased risk of leukemia, lymphoma, and brain tumor among electrical workers exposed to electromagnetic fi eld (EMF). Other investigator reported that continuous exposure of four successive generations of mice to EMF in doses of 1 kV to 5 kV caused tumor formation in offspring. The objective of this study was to evaluate the effect of continuous exposure of three successive generations of mice (Mus musculus L) to EMF of 3 kV, 4 kV, and 5 kV and its implication of chromosomal breakage, as detected by double minute formation.
Methods: Four couples of mice of Swiss Webster strain, 3-4 months of age, and 7-40 gram of body weight were exposed to EMF at the doses of 3 kV, 4 kV, and 5 kV, and one couple served as control. Double minute formation was examined in all offspring, except one couple of each group to be exposed with the same doses of EMF to get the F2 generation, and so forth until F3 generation. Twenty metaphases of chromosomes were examined and frequencies of double minute were calculated in the three generations of all group.
Results: Frequencies of double minute in F1, F2, and F3 of mice exposed to EMF of 3 kV were respectively

0.78+0.08; 0.83+0.09; and 0.80+0.05. In the 4 kV group were 0.083+0.11; 0.73+0.03; and 0.96+0.15, and in the 5 kV group were 0.96+0.25; 0.75+0.05; and 0.99+0.33, whereas no double minute chromosomes were noted in control group. Frequencies of the double minute in mice exposed to EMF were signifi cantly higher than control group.
Conclusions: Continuous exposure of mice during three successive generations to EMF at doses of 3 kV, 4 kV, and 5 kV causes increased chromosomal breakage as detected as double minute chromosome formation. (Med J Indones 2011; 20:109-13)