

**PENINGKATAN KADAR *REACTIVE OXYGEN SPECIES* (ROS) DAN KETEBALAN LAPISAN GRANULAR LUAR CEREBRUM FETUS TIKUS (*Rattus norvegicus* Berkenhout, 1769) AKIBAT PAPARAN GELOMBANG ELEKTROMAGNETIK TELEPON SELULAR 3G**

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**INTISARI**

Telah dilakukan penelitian yang bertujuan untuk mengetahui pengaruh paparan gelombang elektromagnetik ponsel 3G terhadap kadar ROS serta struktur histologi *cerebrum* fetus tikus. Dua puluh lima ekor tikus betina yang telah kopulasi dikelompokkan ke dalam 5 kandang yang terdiri dari : kandang kontrol, perlakuan paparan gelombang 2G *standby*, perlakuan paparan gelombang 2G aktif, perlakuan paparan gelombang 3G *standby*, dan perlakuan paparan gelombang 3G aktif. Perlakuan diberikan 6 jam/hari selama masa gestasi. Pascalahir, fetus ditimbang dan diukur panjang tubuhnya kemudian dieuthanasi dan diambil bagian otaknya secara keseluruhan. Selanjutnya dilakukan pengujian kadar ROS otak dengan metode NBT *assay* serta dibuat preparat histologi dengan metode parafin untuk morfometri lapisan molekular dan granular luar korteks serebral. Hasil yang diperoleh kemudian dianalisis dengan metode *one-way* ANOVA dan DMRT dengan signifikansi  $p < 0,05$ . Absorbansi ROS pada perlakuan paparan gelombang 3G *standby* dan 3G aktif sebesar  $0,11 \pm 0,03$  dan  $0,16 \pm 0,02$  yang lebih besar secara signifikan terhadap kontrol  $0,06 \pm 0,01$ . Hasil pengamatan histologis pada ketebalan lapisan molekular terlihat bahwa hanya kelompok 2G aktif sebesar  $10,51 \pm 2,58 \mu\text{m}$  yang lebih tebal secara signifikan terhadap kelompok kontrol  $5,09 \pm 0,36 \mu\text{m}$ . Sedangkan pada lapisan granular luar pada kelompok 2G aktif, 3G *standby*, dan 3G aktif masing-masing sebesar  $21,99 \pm 1,59 \mu\text{m}$ ,  $21,71 \pm 4,26 \mu\text{m}$ , dan  $17,66 \pm 0,91 \mu\text{m}$  lebih tebal secara signifikan terhadap kelompok kontrol yang sebesar  $12,61 \pm 0,63 \mu\text{m}$ . Kesimpulan yang didapatkan adalah paparan gelombang elektromagnetik ponsel 3G dapat meningkatkan kadar ROS otak fetus dan ketebalan lapisan granular luar, akan tetapi kurang berpengaruh terhadap lapisan molekular pada korteks serebral.

Kata kunci : gelombang elektromagnetik, ponsel 3G, ROS, fetus tikus, korteks serebral.

**INCREASING LEVEL OF REACTIVE OXYGEN SPECIES (ROS) AND EXTERNAL GRANULAR LAYER THICKNESS OF NEWBORN RAT'S (*Rattus norvegicus* Berkenhout, 1769) CEREBRUM CAUSED BY ELECTROMAGNETIC WAVES EXPOSURE FROM 3G MOBILE PHONE**

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**ABSTRACT**

This research aims to determine the effect of electromagnetic waves exposure, emitted from 3G mobile phone on ROS levels and histological structure of rat fetal cerebrum. Twenty five pregnant rats have been randomly grouped into five cages which are: control cage, treatment of 2G wave exposure on standby mode, treatment of 2G wave exposure on active mode, treatment of 3G wave exposure on standby mode, and treatment of 3G wave exposure on active mode. The treatment was given for 6 hours/day during gestation period. After birth, fetuses were weighed and measured the body length, then they were euthanized, and brains were excised. ROS level of the brains were measured using NBT assay. Brain were also prepared with routine histological method and be analyzed their molecular and external granular layer of cerebral cortex morphometrically. All results were analyzed using one-way ANOVA and Duncan Multiple Range Test with  $p < 0,05$  of significance. ROS absorbance of 3G standby and 3G active groups were  $0,11 \pm 0,03$  and  $0,16 \pm 0,02$  respectively, which were significantly greater than control ( $0,06 \pm 0,01$ ). The molecular layer thickness of 2G active group was  $10,51 \pm 2,58 \mu\text{m}$  which was significantly thicker than the control group:  $5,09 \pm 0,36 \mu\text{m}$ . The external granular layer thickness of 2G active, 3G standby and 3G active groups were  $21,99 \pm 1,59 \mu\text{m}$ ,  $4,26 \pm 21,71 \mu\text{m}$  and  $17,66 \pm 0,91 \mu\text{m}$  respectively, which were significantly thicker than the control group ( $12,61 \pm 0,63 \mu\text{m}$ ). The conclusion were the exposure to electromagnetic waves that emitted from 3G mobile phone evidently increase the ROS levels of fetal brain and external granular layer thickness, but had less effect on the molecular layer of the cerebral cortex.

Keywords: electromagnetic waves, 3G mobile phone, ROS, newborn rat, cerebral cortex.