Pengaruh pemberian Monosodiumglutamat pada induk tikus hamil terhadap berat badan dan perkembangan otak anaknya pada usia 7 dan 14 hari = The effects of Monosodium glutamate consumption in pregnant rats to weight and brain development of its offspring in the age of 7 and 14 days

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Abstrak

ABSTRAK
Dasar (Riset Kesehatan Dasar / Riskesdas) yang dilakukan oleh Departemen Kesehatan Indonesia tahun 2010 melaporkan bahwa 17,9 persen (17,9%) dari anak-anak di Indonesia dengan usia di bawah 5 tahun memiliki masalah gizi buruk dan 14 persen (14%) di antara mereka memiliki masalah obesitas. Makanan sehari-hari diduga menjadi penyebab masalah gizi ini terutama penggunaan Monosodium L-glutamat (MSG) yang banyak digunakan sebagai aditif makanan dan zat untuk merangsang nafsu makan. Muncul beberapa pertanyaan tentang hubungan antara konsumsi MSG dan kenaikan berat badan dan hubungan antara efek neurotoksisitas MSG dengan kerusakan sel-sel saraf di otak. Dan apakah kerusakan sel-sel saraf di otak ini mengalami regenerasi atau menjadi persisten?Penelitian ini dilakukan untuk menentukan dampak dari MSG dalam berat badan dan perkembangan otak pada anak tikus dengan usia 7 dan 14 hari di mana ibu mereka diberi MSG selama hamil. Semua anak tikus juga diamati untuk perilaku mereka.

Metode: Rancangan eksperimental in vivo dengan random sampling. Subyek adalah 25 tikus betina (Rattus novergicus) galur Sprague Dawley yang dibagi menjadi 5 kelompok (kelompok kontrol, grup pelarut dan 3 kelompok perlakuan MSG selama kehamilan dengan dosis 1200mg, 2400mg dan 4800mg/kg/day). Ketika tikus hamil melahirkan anaknya diamati sampai usia 7 dan 14 hari. Dua ekor anak tikus diambil secara acak dari tiap induk tikus lalu ditimbang berat badannya. Otak dari anak tikus diisolasi, ditimbang dan diwarnai dengan hematoxylin-eosin (HE) pewarnaan. Photomicrographs dari slide histologis diamati oleh optilab dan dianalisis dengan program Optic Raster. Parameter yang dianalisis dalam penelitian ini adalah penurunan berat badan, kerusakan sel-sel saraf dalam nukleus arkuata dan daerah paraventrikular dari hipotalamus dan perilaku anak tikus pada usia 7 dan 14 hari.

Hasil: MSG dapat menembus blood plansental barrier dan blood brain barrier anak tikus pada usia 7 dan 14 hari ketika ibu mereka diberikan MSG selama hamil. Berat badan anak tikus usia 7 hari lebih rendah pada kelompok MSG dengan dosis 4800mg jika dibandingkan dengan kelompok kontrol dan kelompok pelarut 1200 mg dan 2400 mg. Namun peningkatan berat badan dengan pemberian MSG 4800 mg lebih tinggi jika dibandingkan dengan kelompok MSG dosis 1200mg dan 2400mg. Pada anak tikus usia 14 hari, ditemukan kenaikan berat badan lebih tinggi secara signifikan pada kelompok MSG dengan dosis 4800mg dibandingkan dengan 1200mg dan 2400mg. Berat otak sedikit lebih rendah pada usia 7 dan 14 hari pada kelompok MSG 4800mg . Kerusakan sel saraf dalam nukleus arkuata dan di daerah paraventrikular dari hipotalamus secara signifikan lebih tinggi pada kelompok MSG 4800mg . Perubahan perilaku yang diamati pada anak tikus dengan kelompok MSG 4800mg pada usia 7 dan 14 hari terlihat jelas dibandingkan

kelompok kontrol dan MSG 1200 mg dan 2400 mg.

Kesimpulan: Asupan MSG selama kehamilan menyebabkan perubahan berat badan, berat otak dan kerusakan sel-sel saraf di daerah arkuata dan hipotalamus paraventrikular pada anak tikus dengan usia 7 dan 14.

<hr><i>ABSTRACT

Background: Good Nutrition intake is the most important factor that determines the health status of our next generation. However the Basic Health Research (Riset Kesehatan Dasar / Riskesdas) conducted by the Indonesian Ministry of Health in 2010 reported that 17.9 percent (17.9%) of the children in Indonesia with the age under 5 years old had the problem of malnutrition and 14 percent (14%) among them had the problem of obesity. Daily food was suggested to become a cause of malnutrition problem especially the use of Monosodium L-glutamate (MSG) which is widely used as food additive and a substance to stimulate the appetite. There are some questions about the correlation of MSG consumption and weight gain and the correlation of neurotoxicity effect of MSG with the damage of neuronal cells in the brain. Another question is whether the damage of neuronal cells in the brain is persistent or not. This study was conducted to determine the effects of MSG in the weight gain and in the development of the brain in the rat pups with age of 7 and 14 days in which their mother were given the MSG during pregnancy. The rat pups were also observed for their behavior.

Methods: The experimental design was in vivo studies with randomized sampling. Subjects were 25 female rats (Rattus novergicus)of Sprague-Dawley strain which are divided into 5 groups (control group, solvent group and 3 MSG treatment groups during gestation given MSG in the dose of 1200mg/kgbw/day, 2400mg/kgbw/day and 4800mg/kgbw/day). Upon giving birth the pups were observed until the ages of 7 and 14 days. Two pups from each mother rat were taken randomly. The brain of the rat pups were isolated and stained with hematoxylin-eosin (HE) staining. Photomicrographs of the histological slides were taken by optilab and were analyzed with Image Raster program. The parameters that were analyzed in this experiment were weight body loss, the damage of neuronal cells in the arcuate nucleus and paraventricular area of hypothalamus and the behavior of the pups at age of 7 and 14 days.

Results: High dose MSG penetrate the placental blood barrier and the blood brain barrier in the brain of rat pups with the age of 7 14 days when their mothers were administered with MSG during their pregnant. The body weights of pups with age of 7 days were lower in the MSG treated group with the dose of 4800mg than that in the control and solvent groups. However body weigh were higher in the MSG treated groups of 1200mg/kgbw/day and 2400mg/kgbw/day than those in the control and solvent groups. In the 14 days pups, the body weight were higher significantly in the MSG treated groups with the dose of 4800mg/kgbw/day compared to the 1200mg/kgbw/day and 2400mg/kgbw/day. The weight of the brain was slightly lower at the age of 7 and 14 days in the 4800mg MSG treated group. The neuronal cell damage in the arcuate nucleus and in the paraventricular area of hypothalamus was significantly higher in the 4800mg MSG treated group. The behavior changes were observed in the pups with the 4800mg MSG treated group at the age of 7 and 14 days.

Conclusion: Intake of MSG during gestation causes changes in body weight, brain weight and damage of

neuronal cells in the arcuate and paraventricular area of hypothalamus in rat pups of the age of 7 and 14.</i>