

# Pengaruh Paparan Static Magnetic Field terhadap Ekspresi Protein Dipeptidyl Peptidase 4, Gen Caveolin-1 dan Glut4 pada Mencit Obes = Effect Of Static Magnetic Field Exposure on the Expression Of Dipeptidyl Peptidase 4 Protein, Caveolin-1, and Glut4 Genes in Obese Mice

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## Abstrak

Obesitas merupakan salah satu penyakit gangguan metabolisme yang disebabkan oleh akumulasi lemak berlebih di jaringan adiposa. Obesitas memiliki faktor risiko yang berhubungan dengan kelainan metabolik yang mengakibatkan resistensi insulin seperti penyakit Diabetes Mellitus Tipe 2 (DMT2). Tujuan penelitian ini untuk mengetahui pengaruh mencit obes yang berisiko DMT2 setelah dipajan oleh Static Magnetic Field (SMF). Desain penelitian ini merupakan penelitian eksperimental laboratorium secara *in vivo* dengan menggunakan sampel penelitian berupa mencit jantan galur C57BL/6J berumur 12 hingga 18 minggu yang diberi pakan standar dan pakan tinggi lemak (HFD) lalu dipajan SMF 2 mT selama 2, 7, 14, dan 21 hari dengan durasi waktu 1 jam/hari. Penelitian ini menganalisis pengaruh paparan SMF terhadap glukosa darah, kadar HbA1c, ekspresi protein DPP4, gen Caveolin-1, GLUT4 dan kalsium. Analisis statistik untuk uji glukosa darah dan kadar HbA1c menggunakan Paired sample t test atau Wilcoxon. Analisis statistik untuk selisih glukosa darah, kadar HbA1c, ekspresi protein DPP4, gen Caveolin-1, gen GLUT4, kadar kalsium menggunakan One way ANOVA atau Kruskal-Wallis. Apabila berbeda bermakna maka dilanjutkan dengan Uji Post Hoc atau Mann-Whitney. Uji korelasi antara ekspresi protein DPP4 dengan Ekspresi Gen Caveolin-1 dan GLUT4 dilakukan menggunakan uji korelasi Pearson ( $p > 0,05$ ). Hasil penelitian yang didapat menunjukkan bahwa pemberian paparan SMF pada mencit obes berpengaruh terhadap glukosa darah, kadar HbA1c, ekspresi protein DPP4 dan kalsium ( $p < 0,05$ ). Tidak terdapat perbedaan bermakna pada ekspresi gen Caveolin-1 dan GLUT4 setelah diberikan paparan SMF ( $p > 0,05$ ). Paparan SMF yang terbaik ditunjukkan pada kelompok mencit obes yang dipajan SMF selama 7 hari dapat mempengaruhi glukosa darah, kadar HbA1c, ekspresi protein DPP4, gen Caveolin-1 dan GLUT4 menurun serta peningkatan dalam kadar kalsium.

.....Obesity is one of the metabolic disorders caused by the accumulation of excess fat in adipose tissue. Obesity has risk factors associated with metabolic disorders resulting in insulin resistance, such as Type 2 Diabetes Mellitus (T2DM). This study aimed to examine the effect of static magnetic field (SMF) exposure on obesity-prone mice with T2DM susceptibility. The research design involved an *in vitro* laboratory experimental study using C57BL/6J male mice aged 12 to 18 weeks, fed standard and high-fat diets (HFD), followed by exposure to a 2 mT SMF for duration of 2, 7, 14, and 21 days, with each exposure lasting 1 hour per day. This study observed the effects of SMF exposure on blood glucose, HbA1c levels, DPP4 protein, Caveolin-1 and GLUT4 genes expression, and calcium level. Statistical analysis for blood glucose and HbA1c levels used paired sample t-test or Wilcoxon. Differences in blood sugar, HbA1c levels, DPP4 protein, Caveolin-1 and GLUT4 genes expression, and calcium levels were analyzed using One-way ANOVA or Kruskal-Wallis. If significant differences are found, Post Hoc or Mann-Whitney tests were conducted. The correlation test between DPP4 protein with Caveolin-1 and GLUT4 genes expression were

conducted using Pearson correlation ( $p > 0,05$ ). The research indicated that SMF exposure in obese mice significantly influences blood glucose, HbA1c levels, DPP4 protein, and calcium ( $p < 0.05$ ). There were no significant differences observed in the expression of Caveolin-1 and GLUT4 genes after SMF exposure ( $p > 0.05$ ). The most effective SMF exposure duration was observed in the obese mice group exposed to SMF for 7 days, resulting in decreased blood glucose, HbA1c levels, DPP4 protein, Caveolin-1 and GLUT4 genes expression, as well as increased calcium.