# INTISARI

Kadar gula penderita DM yang tidak terkontrol akan menimbulkan komplikasi sistem saraf berupa *painful diabetic neuropathy* yang merupakan faktor utama terjadinya gangren dan amputasi. Saat ini pilihan pengobatan yang ada masih menimbulkan efek samping yang mengganggu. Varietas jahe merah *Zingiber officinale* var. rubrum memiliki kandungan gingerol dan shogaol tertinggi di antara varietas lain. Gingerol dan shogaol telah diteliti berefek terhadap diabetes, komplikasi diabetes, nyeri, inflamasi, dan neuroprotektif. Penelitian ini bertujuan untuk mengetahui efek pemberian EJM terhadap PDN pada mencit diabetes terinduksi streptozotosin (STZ).

Pembuatan EJM menggunakan metode maserasi dengan etanol 96%. Pada penelitian ini digunakan 30 ekor mencit jantan umur 2-3 bulan dan memiliki kadar gula darah lebih dari 250 mg/dL setelah diinduksi STZ 110mg/kgBB. Mencit dibagi menjadi 6 kelompok: normal (i); PDN (ii); gabapentin (117 mg/kgBB) (iii); EJM I (125 mg/kgBB) (iv); EJM II (250 mg/kgBB) (v); EJM III (500 mg/kgBB) (vi). Empat minggu setelah induksi STZ, respon *baseline* terhadap hiperalgesia termal dan mekanik diukur. EJM diberikan pada minggu ke-5-7 setelah induksi. Pengukuran respon nyeri, glukosa darah, dan bobot badan dilakukan setiap minggu. Pada akhir penelitian hewan uji dikorbankan, sumsum tulang belakang dibuat preparat IHC dengan antibodi TRPV1.

Hasil ekstraksi yang diperoleh sebesar 10.71% b/b. Kandungan shogaol dalam ekstrak sebesar 4,12±0,285 % b/b**.** Sebanyak 87,50% hewan uji mengalami DM setelah diinduksi. Tidak terdapat perbedaan signifikan ($p>0,05$) pada BB akibat induksi maupun perlakuan. Kadar GDP mengalami kenaikan signifikan ($p<0,05$) akibat induksi dan tidak berkurang signifikan setelah perlakuan ($p>0,05$). Nilai presentase hipersensitivitas terhadap stimulus panas dan mekanik sebesar 58,21±1,72% dan 81,68±1,34%. Terdapat perbedaan signifikan ($p<0,05$) terhadap hiperalgesia termal dan mekanik setelah perlakuan. Hasil pengamatan IHC menunjukkan bahwa ukuran sel saraf sensori kembali normal dari keadaan hipertropi dan ekspresi TRPV1 tidak berbeda dengan kelompok normal. Pemberian EJM selama 21 hari pada mencit PDN mampu menurunkan respon nyeri hiperalgesia mencit terhadap stimulus panas dan mekanik yang salah satu mekanismenya melalui penurunan ekspresi TRPV1 pada sumsum tulang belakang.

**Kata kunci** **:** jahe merah, *painful diabetic neuropathy*, hiperalgesia, TRPV1

# *ABSTRACT*

Uncontrolled blood glucose levels of DM patients will cause nervous system complications in the form of painful diabetic neuropathy (PDN) which is a major factor in the occurrence of gangrene and amputation. Nowaday the treatments still cause unpleasant side effect. *Zingiber officinale* var. rubrum has the highest content of gingerol and shogaol among other varieties. Gingerol and shogaol have been investigated for effects on diabetes, diabetes complications, pain, inflammation, and neuroprotective. This study aims to determine the effect of giving red ginger extract (EJM) to PDN in streptozotosin-induced diabetes mice (STZ).

EJM was made by maceration method using ethanol 96%. Of 30 male Balb/C mice aged 2-3 months, 5 were left normal (i) and 25 mice that had blood sugar levels of more than 250 mg/dL after being induced by 110mg/kgBW STZ were divided into 5 groups: PDN (ii); gabapentin (117 mg/kgBB) (iii); EJM I (125 mg/kgBW) (iv); EJM II (250 mg/kgBW) (v); EJM III (500 mg/kgBW) (vi). Four weeks after STZ induction, the baseline response to the nociceptive pain response (thermal and mechanical hyperalgesia) was measured. EJM was given at 5-7 weeks after induction. Measurements of pain response, blood glucose, and body weight were done every week. At the end of the study the animals were sacrificed, spinal cord were taken and then the immunohistochemistry preparation of TRPV1 was made.

The result showed that the extraction process produced EJM with a yield of 10.71% b/b. The content of shogaol in the extract was 4.12±0.285% w/w. A total of 87.50% of test animals experienced DM after induction. There was no significant difference ($p>0.05$) in body weight due to induction or treatment. The level of fasting blood glucose increased significantly ($p<0.05$) due to induction and did not decrease significantly after treatment ($p>0.05$). The percentage of hypersensitivity to heat and mechanical stimulus was 58.21±1.72% and 81.68±1.34%. There was a significant difference ($p<0.05$) on the thermal and mechanical hyperalgesia after treatment. Based on IHC scanning, the hyperthropic sensory nerve cells were back to normal size and the TRPV1 expression of sensory nerve celss were not different to normal group. EJM administration for 21 days on PDN mice can reduce thermal and mechanical hyperalgesia by one of it's mechanism that is lowering TRPV1 expression on spinal cord.

**Key words** **:** red ginger, painful diabetic neuropathy, hyperalgesia, TRPV1