

INTISARI

Jamur *Rhizopus spp.* selama pembuatan tempe menghidrolisis glikosida isoflavonoid menjadi aglikon. Diperlukan varietas kedelai terbaik, suhu dan lama waktu fermentasi optimal agar dihasilkan tempe dengan kadar total isoflavonoid tinggi. Penelitian bertujuan mengetahui varietas kedelai terbaik, suhu dan waktu fermentasi optimal, daya ingat, kadar superoksida dismutase (SOD), glutathion peroksidase (GPx), asetilkolin (ACh) serta jumlah neuron hipokampus mencit.

Kedelai (*Glycine max* L. Merrill) dipilih dari 5 varietas: Devon-1, Dena-1, Dega-1, Anjasmoro dan Argomulyo. Total isoflavonoid ditetapkan secara spektrofotometri ultraviolet pada 262 nm. Tempe dibuat pada 3 kondisi: (1) suhu kamar (37-32 °C) tanpa sirkulasi udara, (2) suhu 27±0,5 °C dan (3) suhu 30±0,5 °C keduanya dengan sirkulasi udara, dipilih sifat fisik tempe terbaik. Berdasar kondisi terbaik, dibuat tempe dengan variasi lama fermentasi, diukur kadar total isoflavonoid. Mencit jantan galur Swiss dibagi 5 kelompok: (1) kontrol pelarut CMC-Na 0,5%, (2) etanol 15%, (3) Donepezil-HCl 1 mg/kg BB, (4) genistein 2,55 mg/kg BB, dan (5) ekstrak etanol tempe 500 mg/kg BB. Uji daya ingat secara *passive avoidance* (PA) dan *rewarded alternation* (RA). Otak mencit diukur enzim SOD dan GPx, kadar ACh, dan jumlah neuron hipokampus daerah CA1 sepanjang 730 µm.

Varietas Devon-1 mengandung total isoflavonoid tertinggi. Fermentasi kondisi (2) selama 72 jam menghasilkan tempe dengan kadar total isoflavonoid tertinggi. Pembuatan tempe menurunkan total isoflavonoid 19,95%, namun naik 454,29% dalam ekstrak. Etanol menurunkan daya ingat, aktivitas SOD, GPx, dan jumlah neuron, namun kadar ACh naik. Dibandingkan semua kelompok, ekstrak tempe nyata meningkatkan daya ingat jangka pendek dan jangka panjang pada uji PA, namun tidak nyata pada uji RA. Daya ingat juga meningkat pada pemberian genistein dan Donepezil-HCl namun di bawah ekstrak tempe. Pada uji PA, dibandingkan kelompok kontrol, ekstrak tempe meningkatkan daya ingat jangka pendek 143%, jangka panjang 300%. Meningkatnya daya ingat diikuti oleh tingginya aktivitas SOD dan GPx, kadar ACh, serta jumlah neuron hipokampus.

Kata kunci: tempe, isoflavonoid, daya ingat, *passive avoidance*, *rewarded alternation*

ABSTRACT

The fungus of *Rhizopus spp.* during the manufacture of tempeh able to hydrolyzes isoflavone glycosides into aglycones. This study aimed to determine the best soybean variety, levels of superoxide dismutase (SOD), glutathione peroxidase (GPx), acetylcholine (ACh), and the number of hippocampal neurons in mice brain.

Soybeans were selected from 5 varieties: Devon-1, Dena-1, Dega-1, Anjasmoro, and Argomulyo. Total isoflavones were determined by ultraviolet spectrophotometry at 262 nm. Tempeh was made in 3 conditions: (1) room temperature (37-32 °C) without air circulation, (2) 27±0.5 °C and (3) 30±0.5 °C both with air circulation. The best condition was determined from the physical properties of tempeh. Based on the best conditions, tempeh was made with variations in fermentation time. The optimal fermentation time was based on the total isoflavonoid content of tempeh. Swiss strain male mice were divided into 5 groups: (1) CMC-Na 0.5% solvent control, (2) 15% ethanol, (3) Donepezil-HCl 1 mg/kg BW, (4) genistein 2.55 mg/kg BW, and (5) tempeh ethanol extract 500 mg/kg BW. Memory with passive avoidance (PA) and rewarded alternation (RA) tests. The mice brains were measured for SOD and GPx enzyme activity, as well as ACh level. The number of hippocampal neurons was count in the CA1 region along 730 um.

The Devon-1 soybean variety contains the highest total isoflavones. Fermentation at conditions (2) produced the best tempeh. Fermentation for 72 hours in condition (2) produced tempeh with the highest total isoflavones content. Compared to soybeans, making tempeh reduces isoflavones levels by 19.95%, but increases by 454.29% in extract. Ethanol decreased the mice's memory, SOD, GPx, and the number of neurons, but ACh levels increased. Compared to all groups, tempeh extract significantly increased short-term and long-term memory on the PA test, but not significantly on the RA test. Memory also increased when given genistein and Donepezil-HCl but lower than by tempeh extract. In the PA test, compared to the control group, tempeh extract increased short-term memory by 143% and long-term by 300%. Improved memory was followed by high activity of SOD and GPx, ACh levels, and the number of hippocampal neurons.

Keywords: tempeh, isoflavones, memory, passive avoidance, rewarded alternation