

**PERBEDAAN PEMBERIAN TEPUNG TEMPE DAN SUSU  
KEDELAI TERHADAP KADAR GLUKOSA DARAH DAN  
EKSPRESI INSULIN SEL BETA PANKREAS**

*(Studi Pada Tikus *Sprague Dawley* Diabetik karena Induksi *Streptozotocin*)*

***THE DIFFERENCE BETWEEN TEMPE FLOUR AND SOYMILK ON  
BLOOD GLUCOSE LEVEL AND INSULIN EXPRESSION ON  
PANCREATIC BETA CELLS***

*Study on Streptozotocin Induced Diabetic Sprague Dawley Rats*



**Tesis  
Untuk memenuhi sebagian persyaratan  
mencapai derajat S2**

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**April  
2014**

## Abstrak

### Perbedaan Pemberian Tepung Tempe dan Susu Kedelai terhadap Kadar Glukosa Darah dan Ekspresi Insulin Sel Beta Pankreas

(Studi pada tikus *Sprague dawley* diabetik karena induksi *streptozotocin*)

**Latar belakang;** Hiperglikemia pada diabetes melitus dapat dikarenakan destruksi sel  $\beta$  pankreas sehingga meningkatkan radikal bebas. Kandungan isoflavon tempe dan susu kedelai berpotensi sebagai antioksidan dan anti hiperglikemia.

**Tujuan;** Membuktikan pengaruh tepung tempe kedelai dan susu kedelai terhadap kadar glukosa darah puasa (GDP) dan ekspresi insulin sel  $\beta$  pankreas tikus *sprague dawley* (SD) diabetik karena induksi *streptozotocin* (STZ).

**Metode;** Tikus SD jantan 18 ekor diinduksi STZ 65mg/kg BB+NA 230 mg/kg BB *intraperitoneal* kemudian dibagi menjadi K1 (kelompok kontrol positif), P1 (diberi tepung tempe kedelai 1,8 g/200 g BB), P2 (diberi susu kedelai 1,35 g/200 g BB). Perlakuan secara sonde 1x/hari selama 28 hari. Kadar GDP menggunakan metode GOD-PAP. Analisis ekspresi insulin menggunakan metode imunohistokimia. Analisis data menggunakan *independent t test, one way anova* dilanjutkan *post hoc*.

**Hasil;** Rerata kadar GDP awal perlakuan pada K1, P1, dan P2 masing- masing 220,4 $\pm$ 9,6 mg/dl, 217,5 $\pm$ 6,9 mg/dl, dan 214,9 $\pm$ 8,6 mg/dl. Rerata kadar GDP setelah 28 hari perlakuan pada K1, P1, dan P2 masing- masing 231,7 $\pm$ 7,9 mg/dl, 91,6 $\pm$ 5,5 mg/dl dan 132,7 $\pm$ 6,9 mg/dl. Penurunan kadar GDP setelah pemberian tepung tempe lebih banyak daripada susu kedelai ( $p=0,0001$ ) dan kontrol ( $p=0,0001$ ). Susu kedelai menurunkan kadar GDP lebih banyak daripada kontrol ( $p=0,0001$ ). Rerata *Allred score* ekspresi insulin sel  $\beta$  pankreas pada K1, P1 dan P2 sebesar 2,7 $\pm$ 2,3, 6,2 $\pm$ 1,5, dan 6,8 $\pm$ 1,2. Tidak ada perbedaan *Allred score* antara tepung tempe dan susu kedelai ( $p=0,405$ ).

**Kesimpulan;** Tepung tempe dan susu kedelai menurunkan kadar GDP. Tepung tempe menurunkan kadar GDP lebih banyak daripada susu kedelai. Tepung tempe dan susu kedelai meningkatkan ekspresi insulin sel  $\beta$  pankreas.

Kata kunci: tepung tempe, susu kedelai, glukosa darah puasa, diabetes melitus, ekspresi insulin sel  $\beta$  pankreas.

## Abstrak

### The Difference Between Tempe Flour and Soymilk on Blood Glucose Level and Insulin Expression On Pancreatic Beta Cells

(Study on Streptozotocin Induced Diabetic Sprague Dawley Rats)

**Background;** Hyperglycemia in diabetes mellitus due to pancreatic  $\beta$  cell destruction can cause free radicals production increase. Isoflavone content in tempe and soy milk have a potential antioxidant and antihyperglycemia.

**Objective;** This research aimed to analyze the influence of tempe flour and soy milk on fasting blood glucose levels (FBG) and insulin expression of pancreatic  $\beta$  cells in streptozotocin (STZ) induced diabetic Sprague Dawley rats (SD).

**Methods;** eighteen SD male rats were induced by STZ 65 mg/kg BW+NA 230 mg/kg BW intraperitoneally and randomly divided into K1 (positive control group), P1 (given tempe flour 1.8 g/200 g BW) and P2 (given soy milk 1.35 g/200 g BW). The treatment was given via sonde 1x/day for 28 days. FBG levels were checked by GOD-PAP method. Insulin expression analysis was done by immunohistochemical. Independent t test, anova and post hoc LSD were used for data analysis.

**Results;** The mean FBG level on early treatment in K1, P1, P2 were 220.4 $\pm$ 9.6 mg/dl, 217.5 $\pm$ 6.9 mg/dl, 214.9 $\pm$ 8.6 mg/dl respectively. After 28 days of treatment, the mean FBG level at K1, P1 and P2 were 231.7 $\pm$ 7.9 mg/dl, 91.6 $\pm$ 5.5 mg/dl and 132.7 $\pm$ 6.9 mg/dl, respectively. Tempe flour significantly decrease FBG level better than soy milk and control group ( $p=0.0001$ ). There were also a significantly decrease in FBG level on soymilk group compared to control ( $p=0.0001$ ). The mean insulin expression on K1, P1 and P2 were 2.67 $\pm$ 2.34, 6.17 $\pm$ 1.47, and 6.83 $\pm$ 1.17 respectively. The insulin expression of both groups were not significantly different ( $p=0.405$ ).

**Conclusion;** Tempe flour and soy milk decreased FBG level. Tempe flour decreased FBG level better than soy milk. Both intervention cause higher insulin expression of pancreatic  $\beta$  cells.

**Keywords:** tempe flour, soy milk, fasting blood glucose, diabetes mellitus, pancreatic  $\beta$  cell insulin expression.