

**EFEKTIVITAS KOMBINASI EKSTRAK LIKOPEN DAN METFORMIN
TERHADAP FUNGSI FAGOSITOSIS PADA TIKUS (*RATTUS NORVEGICUS*) DM
TIPE 2 KAJIAN: RERATA KADAR GULA DARAH, INDEKS FAGOSITOSIS,
KADAR ROS, NO DAN AGE_s**

ABSTRAK

Latar Belakang: Hiperglikemia kronik pada pasien DM tipe 2 (DMT2) dapat meningkatkan stres oksidatif dan menyebabkan disfungsi fagositosis. Metformin sebagai obat standar belum maksimal memperbaiki fungsi fagositosis. Likopen sebagai antioksidan dan immunomodulator dapat memperbaiki stres oksidatif diabetes.

Tujuan: Mengetahui efektivitas kombinasi likopen dengan metformin terhadap fungsi fagositosis, HbA1c, nitric oxide (NO), reactive oxidative stress (ROS), dan advanced glycation end products (AGE_s).

Metode Penelitian: Model tikus DM tipe 2 diinduksi dengan diet tinggi lemak 2 minggu, diikuti pemberian streptozotocin dan Nicotinamide. Tikus dibagi menjadi enam kelompok (n = 30) yaitu normal (N); dan diabetes melitus tipe 2 (DM) diberi 1 ml minyak kelapa; DMT2 diberi metformin dosis 250 mg/kg (DMet); DMT2 diberi kombinasi metformin dengan likopen dosis 10 (DML-10); 20 (DML-20); dan 40 mg/kg (DML-40). Metformin dan likopen dilarutkan dalam 1 ml minyak kelapa, diberikan setiap hari selama 28 hari. Parameter yang diperiksa adalah indeks fagositosis (IF) makrofag, kadar HbA1c, ROS, NO, dan AGE_s serum.

Hasil Penelitian: Jumlah IF DML-20 dan DML-40 lebih tinggi dan kadar HbA1c, NO, ROS, dan AGE_s lebih rendah dibandingkan kelompok DMet ($p < 0,05$). Perbedaan rerata masing-masing IF=0,11 dan 0,33%; HbA1c= 5,25 dan 10,55 ng/ml; NO= 0,46 dan 1,75 ng/ml; ROS= 0,99 dan 1,78 nmol/ml; dan AGE_s= 1,89 dan 2,63 ng/ml. Terdapat pengaruh dosis likopen terhadap perubahan fungsi fagositosis sebesar 78,7%. ($\beta = 0,787$, CI 95%: 0,030 - 0,179, $p=0,010$)

Kesimpulan: Kombinasi likopen dengan metformin efektif dan bersinergi menghasilkan fungsi fagositosis yang lebih tinggi, kadar glukosa darah dan stres oksidatif diabetes yang lebih rendah dibandingkan dengan kelompok kontrol

Kata kunci

Diabetes mellitus; likopen; metformin; fagositosis

THE EFFECTIVENESS OF COMBINATION OF LYCOPENE EXTRACT AND METFORMIN ON THE PHAGOCYTOSIS FUNCTION IN TYPE 2 DM RAT (RATTUS NORVEGICUS): An Overview of Blood Glucose Average, ROS, NO, and AGEs Levels

ABSTRACT

Background: Chronic hyperglycemia in type 2 diabetes mellitus (T2DM) patients can increase oxidative stress and cause phagocytosis dysfunction. Metformin, as standard therapy, has not optimally improved the function of phagocytosis. Lycopene, as an antioxidant and immunomodulator, can decrease diabetes' oxidative stress.

Objective: This study aims to determine the effectiveness of the combination of lycopene with metformin on phagocytosis index (PI), HbA1c, nitric oxide (NO), reactive oxidative stress (ROS), and advanced glycation end products (AGEs).

Methods: Modeling of T2DM rats was induced by a high-fat diet for 2 weeks combined with streptozotocin–nicotinamide. Randomly rats were divided into 6 groups (N = 30), namely normal rats (N); and DMT2 (DM) rats were given 1 ml of coconut oil; DMT2 were treated with metformin at a dose of 250 mg/kg (DMet); DMT2 rats were treated with a combination of metformin and lycopene at a dose of 10 mg/kg (DML-10); 20 mg/kg (DML-20); and 40 mg/kg (DML-40) in 1 mL of coconut oil daily for 4 weeks.

Result: The PI numbers of the DML-20 and DML-40 groups were higher, and the levels of HbA1c, NO, ROS, and AGEs were lower than those of the DMet group ($p < 0.05$). The mean difference of PI= 0.11 and 0.33%; HbA1c= 5.25 and 10.55 ng/ml; NO= 0.46 and 1.75 ng/ml; ROS= 0.99 and 1.78 nmol/ml; and AGEs= 1.89 and 2.63 ng/ml. There is a dose dependence of lycopene on phagocytosis function of 78,7%.

Conclusion: The combination of lycopene with metformin is effective and synergis to increase phagocytic function by reducing blood glucose and oxidative stress in type 2 diabetic rats.

Keywords:

Diabetes mellitus; lycopene; metformin; phagocytosis