

## ABSTRAK

**Latar Belakang:** Prevalensi diabetes di Indonesia diprediksi akan meningkat dari 5,6% pada tahun 2013 menjadi 6,7% pada tahun 2035. Hemoglobin A1c (HbA1c) merupakan parameter metabolisme glukosa yang dapat digunakan dalam prediksi dan manajemen diabetes. Penelitian menunjukkan bahwa keragaman makanan yang diukur menggunakan *Dietary Diversity Score* (DDS), obesitas dan kadar *high-sensitivity C-reactive protein* (hs-CRP) berhubungan dengan metabolisme glukosa. Namun, masih terbatas penelitian tentang hubungan DDS dengan HbA1c. Selain itu, masih terbatas pula data tentang hubungan obesitas dan hs-CRP terhadap HbA1c pada semua spektrum homeostasis glukosa pada orang Indonesia.

**Tujuan:** Mengetahui hubungan antara *Dietary Diversity Score* (DDS), obesitas, dan kadar *high-sensitivity C-reactive protein* (hs-CRP) dengan kadar HbA1c pada subjek dewasa Indonesia.

**Metode:** Penelitian ini menggunakan rancangan *cross-sectional* dengan menganalisis data *Indonesia Family Life Survey* (IFLS 5) tahun 2014-2015. Sebanyak 3.825 subjek IFLS 5 yang berumur 20-59 tahun dilibatkan dalam penelitian ini. DDS diukur berdasarkan keragaman makanan kualitatif kelompok makanan utama yaitu sumber karbohidrat, sumber protein, susu dan olahannya, sayur dan buah. Obesitas diukur dengan klasifikasi Indeks Massa Tubuh untuk orang Indonesia. Analisis sampel darah menggunakan spesimen *dried blood spot* (DBS). Kadar hs-CRP dianalisis dengan metode *enzyme-linked immunosorbent assay* (ELISA) dan kadar HbA1c dianalisis menggunakan *Bio-Rad system*. Uji statistik yang digunakan dalam analisis bivariat adalah uji beda dan uji korelasi sedangkan analisis multivariat menggunakan *multiple linear regression*.

**Hasil:** Rerata HbA1c subjek adalah  $5,54 \pm 1\%$ . Sebesar 65,15% subjek berada pada kelompok DDS tinggi. Proporsi obesitas sebesar 20,13%. Median (persentil 25-75) hs-CRP adalah 0,78 mg/L (0,29-2,23 mg/L). Hasil analisis menunjukkan DDS berhubungan dengan kadar HbA1c ( $F=3,50$ ;  $p=0,030$ ). Namun, hubungan tersebut tidak *favorable* karena kelompok DDS tinggi memiliki kadar HbA1c yang secara signifikan lebih tinggi daripada kelompok DDS rendah. Obesitas berhubungan dengan kadar HbA1c ( $t=-8,7133$ ;  $p<0,001$ ). Kelompok obes memiliki HbA1c yang lebih tinggi daripada kelompok nonobes. Kadar hs-CRP berhubungan dengan kadar HbA1c dengan arah korelasi yang positif ( $r=0,1194$ ;  $p<0,001$ ).

**Kesimpulan:** DDS, obesitas dan hs-CRP berhubungan dengan kadar HbA1c pada subjek dewasa Indonesia. Masih terbatas penelitian tentang hubungan DDS dan HbA1c sehingga penelitian lebih banyak diperlukan untuk investigasi lebih lanjut dan untuk lebih memahami hubungan keragaman makanan dan HbA1c.

**Kata Kunci:** *Dietary Diversity Score*, HbA1c, *High-sensitivity C-reactive protein*, Obesitas

## ABSTRACT

**Background:** Prevalence of diabetes in Indonesia is predicted to increase from 5.6% in 2013 to 6.7% by 2035. Hemoglobin A1c (HbA1c) is a parameter of glucose metabolism that can be used in prediction and management of diabetes. Growing evidence has suggested that dietary diversity measured in Dietary Diversity Score (DDS), obesity and high-sensitivity C-reactive protein (h-CRP) are associated with glucose metabolism. However, studies on the association between DDS and HbA1c are scarce. Moreover, limited data exist regarding the association of obesity and hs-CRP with HbA1c in all spectrums of glucose homeostasis in the general population in Indonesia.

**Objective:** To determine the association of Dietary Diversity Score (DDS), obesity, and high-sensitivity C-reactive protein (hs-CRP) levels with HbA1c in Indonesian adults.

**Method:** We conducted a cross-sectional study analyzing data from the Indonesia Family Life Survey (IFLS) 2014-2015. A total of 3.825 IFLS 5 participants aged 20-59 years old were included in this study. DDS was measured by the qualitative food diversity of the main food groups, which were the sources of carbohydrates, proteins, dairy products, vegetables, and fruits. Obesity was measured by the Body Mass Index (BMI) classification for Indonesians. Dried blood spot (DBS) specimens were used in blood biochemical analyses. Levels of hs-CRP were analyzed using enzyme-linked immunosorbent assay (ELISA) and HbA1c was analyzed using Bio-Rad system.

**Results:** The mean HbA1c in all subjects was  $5.54 \pm 1\%$ . A total of 65.15% of subjects were in the high DDS group. The proportion of obesity was 20.13%. Median (25<sup>th</sup>-75<sup>th</sup> percentiles) hs-CRP was 0.78mg/L (0.29-2.23 mg/L). This study found that DDS was associated with HbA1c ( $F=3.50$ ;  $p=0.030$ ). However, this relationship was not favorable because the high DDS group had significantly higher HbA1c levels than the low DDS group. Obesity was associated with HbA1c ( $t=-8,7133$ ;  $p<0.001$ ). Obese group had higher HbA1c than the nonobese group. This study also showed that hs-CRP was associated with HbA1c with a positive correlation ( $r=0.1194$ ;  $p<0.001$ ).

**Conclusion:** DDS, dan obesity and hs-CRP are associated with HbA1c levels in Indonesian adults. Data about association between DDS and HbA1c are limited so that more researches are needed for further investigation and for better understanding on the association between dietary diversity and HbA1c.

**Keywords:** Dietary Diversity Score, HbA1c, High-sensitivity C-reactive protein, Obesity