

## ABSTRAK

### Asosiasi antara Kadar HbA1c dan *Transforming Growth Factor Beta 1* Plasma pada Pasien Diabetes Mellitus Tipe 2

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**Latar belakang:** Diabetes mellitus telah menjadi masalah kesehatan utama di seluruh dunia, dengan angka morbiditas dan mortalitas yang terus meningkat. Hiperglikemia kronik memegang peran penting dalam inisiasi dan progresi dari komplikasi mikrovaskuler diabetik. Penelitian terbaru menunjukkan bahwa patofisiologi mikrovaskuler diabetik dikaitkan dengan proses inflamasi kronik yang dipicu oleh peran beberapa sitokin dan *growth factors*. *Transforming Growth Factor Beta -1* (TGF  $\beta$ 1) diduga merupakan mediator kunci patogenesis komplikasi mikrovaskuler yang terkait hiperglikemia kronis. Namun, penelitian-penelitian yang ada tentang hubungan TGF  $\beta$ 1 dengan kondisi hiperglikemia kronis menunjukkan hasil yang kontroversial.

**Tujuan:** Menentukan asosiasi antara kadar HbA1c dan TGF  $\beta$ 1 plasma pada pasien DMT2.

**Metode:** Penelitian observasional analitik *cross-sectional* pada pasien DMT2 yang berumur 18 tahun keatas. HbA1c diukur menggunakan sampel darah vena dengan antikoagulan menggunakan metode HPLC (*High Performance Liquid Chromatography*). Pemeriksaan TGF  $\beta$ 1 dilakukan dengan metode ELISA (*Enzyme Linked Immunosorbent Assay*) dengan menggunakan reagensia Human TGF  $\beta$ 1 *quantikine* ELISA (R&D). Analisis statistik korelasi antara kadar HbA1c dan TGF  $\beta$ 1 plasma menggunakan uji korelasi *Spearman*.

**Hasil:** Jumlah subyek penelitian 30 orang. Median kadar HbA1c yaitu 7,15 % (4,7-13,6 %). Median kadar TGF  $\beta$ 1 plasma yaitu 150,8 pg/mL (23,6-2089,2 pg/mL). Uji korelasi Spearman menunjukkan terdapat korelasi positif kuat dan bermakna antara kadar HbA1c dan TGF  $\beta$ 1 plasma pada pasien DMT2 ( $r_s = 0,637$ ;  $p = 0,000$ ).

**Kesimpulan:** Terdapat asosiasi positif bermakna antara antara kadar HbA1c dan TGF  $\beta$ 1 plasma pada pasien DMT2.

**Kata kunci:** HbA1c, *Transforming Growth Factor Beta 1*, DM tipe 2

**ABSTRACT**

***Association of HbA1c with Plasma Transforming Growth Factor Beta-1  
In Type 2 Diabetes Mellitus Patients***

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**Background:** Diabetes mellitus has become major public health problem all over the world, and accounts for significant morbidity and mortality. Chronic hyperglycemia plays a key role in the initiation and progression of diabetes microvascular complication. Several studies have reported that chronic inflammation process which triggered by various cytokines and growth factors, were associated with the pathogenesis of microvascular complication. Transforming Growth Factor Beta-1 (TGF  $\beta$ 1) plays an important role in the pathogenesis of microvascular complication related with chronic hyperglycemia. However, several studies about TGF  $\beta$ 1 and chronic hyperglycemia association in type 2 DM, showed controversial results.

**Objective:** To determine association of HbA1c with plasma transforming growth factor beta-1 in type 2 DM patients.

**Methods:** Analytic observational cross sectional study in type 2 DM patients with age older than 18 years old and met the inclusion and exclusion criteria. Hemoglobin A1c was measured from blood vein with anticoagulants, using High Performance Liquid Chromatography (HPLC). TGF  $\beta$ 1 was measured with Human TGF  $\beta$ 1 quantikine ELISA. Bivariate correlation between HbA1c with level of TGF  $\beta$ 1 were analyzed using Spearman's correlation test.

**Results:** Thirty type 2 DM patients were enrolled in this study. The median HbA1c level was 7,15% (4,7-13,6 %). The median TGF  $\beta$ 1 levels was 150,8 pg/mL (23,6-2089,2 pg/mL). Results of Spearman's correlation test showed significantly positive correlation between HbA1c with plasma TGF  $\beta$ 1 ( $r_s=0,637$  ;  $p=0.000$ ).

**Conclusions:** There was significantly positive association between HbA1c and plasma TGF  $\beta$ 1 level in type 2 DM patients.

**Key words:** HbA1c, Transforming Growth Factor Beta 1, type 2 DM