

**Latar belakang:** Kromium merupakan unsur yang memiliki beberapa tingkatan oksidasi. Kromium (VI) adalah logam berat polutan toksik karsinogenik dan dapat memasuki sirkulasi darah melalui proses ingesti dan inhalasi. Fiksator warna yang digunakan oleh pekerja batik mengandung kromium. Inhalasi kromium (VI) kadar tinggi dapat menyebabkan iritasi rongga hidung, ulserasi hidung, kerusakan tulang hidung, hingga kanker. Metabolisme kromium dilakukan dengan mengonjugasi kromium dengan *glutathione*. Proses konjugasi ini dikatalisis oleh enzim *glutathione s-transferase* yang disintesis oleh gen *Glutathione s-transferase (GST)*. Salah satu isoform gen *GST* adalah *GSTT1*. Variasi gen *GSTT1* menyebabkan ketiadaan enzim *glutathione s-transferase theta 1*, sehingga kromium sulit diekskresikan. Penelitian melihat hubungan antara variasi gen *GSTT1* terhadap kadar kromium darah pada pekerja batik di Kecamatan Lendah, Kulon Progo. Penelitian juga menghitung frekuensi variasi gen *GSTT1* dan frekuensi pekerja batik Kecamatan Lendah Kulon Progo dengan kadar kromium darah yang tinggi.

**Metode:** Metode penelitian adalah *cross-sectional* dengan menggunakan data sekunder. Frekuensi variasi gen *GSTT1* dan frekuensi pekerja batik dengan kadar kromium tinggi dihitung, kemudian dilakukan uji statistik *Fisher's Exact Test* untuk melihat hubungan variasi gen *GSTT1* dengan kadar kromium darah. Uji Mann-Whitney dan uji median dilakukan untuk mengetahui rerata dan median kadar kromium darah berturut-turut. Uji Kruskal Wallis dan Mann-Whitney juga dilakukan untuk membandingkan rerata kromium pada berbagai kelompok usia, indeks massa tubuh (IMT), lama kerja, dan jenis kelamin.

**Hasil:** Frekuensi variasi gen *GSTT1* pada pekerja batik Kecamatan Lendah, Kulon Progo adalah 25,64%. Frekuensi pekerja batik dengan kadar kromium tinggi adalah 89,74%. Hubungan variasi gen *GSTT1* dengan kadar kromium darah tidak signifikan ( $P=0,267$ ). Tidak terdapat perbedaan rerata dan median kadar kromium darah pada kelompok variasi ( $P=0,552$ ;  $P=0,408$ ). Selain itu, tidak terdapat perbedaan rerata kromium pada berbagai kelompok usia, IMT, lama kerja, dan jenis kelamin ( $P=0,262$ ,  $P=0,984$ ,  $P=0,164$ ,  $P=0,053$ ).

**Kesimpulan:** Tidak terdapat hubungan antara variasi gen *GSTT1* dengan kadar kromium darah pada pekerja batik Kecamatan Lendah, Kabupaten Kulon Progo. Terdapat sedikit pekerja batik Kecamatan Lendah, Kulon Progo dengan delesi gen *GSTT1* (25,64%) dan sebagian besar pekerja batik Kecamatan Lendah, Kulon Progo memiliki kadar kromium tinggi (89,74%).

**Kata kunci:** variasi gen *GSTT1*, glutation, metabolisme kromium, kromium heksavalen, toksisitas kromium

## ABSTRACT

**Background:** Chromium is an element with several oxidative states. Chromium (VI) is a heavy metal toxic carcinogenic pollutant, capable of entering blood circulation by ingestion and inhalation. Color fixator that is used by batik workers contains chromium. Inhalation of high concentration of chromium (VI) can cause nasal cavity irritation, nose ulceration, nasal bone damage, until cancer. Chromium metabolism is done by conjugating chromium with *glutathione*. This conjugation process is catalyzed by enzyme *glutathione s-transferase* enzyme which is synthesized by gene Glutathione S-transferase (*GST*). One of the *GST* isoforms is *GSTT1*. Genetic variation of *GSTT1* results in the absence of enzyme *glutathione s-transferase theta 1*, therefore chromium undergoes difficulty in excretion. This research examines the relation between genetic variation of *GSTT1* to blood chromium concentration of batik workers in Lendah District, Kulon Progo Regency. This research also calculates frequency of genetic variation of *GSTT1* and frequency of batik workers in Lendah District, Kulon Progo Regency with high blood chromium.

**Methods:** The research method is cross-sectional using secondary data. The frequency of genetic variation is calculated, then Fisher's Exact Test statistic test is done to examine the relation between genetic variation of *GSTT1* to blood chromium concentration. Mann-Whitney and median test are done to compare blood chromium concentration means and median in subjects with and without genetic variation respectively. Kruskal Wallis dan Mann-Whitney tests are also done to compare blood chromium means in subjects with various age, body mass index, work duration, and gender.

**Results:** The proportion of genetic variation of *GSTT1* in batik workers of Lendah District, Kulon Progo Regency is 25,64%. The proportion of batik workers with high blood chromium concentration is 89,74%. The relation between genetic variation of *GSTT1* to blood chromium concentration shows no significance ( $P=0,267$ ). There is no significant difference between blood chromium concentration means and medians in subjects with and without genetic variation ( $P=0,552$ ;  $P=0,408$ ). There is also no significant difference between blood chromium concentration means in subjects with with various age, body mass index, work duration, and gender categories ( $P=0,262$ ,  $P=0,984$ ,  $P=0,164$ ,  $P=0,053$ ).

**Conclusion:** There is no relation between genetic variation of *GSTT1* and blood chromium concentration of batik workers in Lendah District, Kulon Progo Regency. There are few batik workers in Lendah District, Kulon Progo with genetic variation of *GSTT1* (25,64%) and most batik workers in Lendah District, Kulon Progo exhibit high blood chromium (89,74%).

**Key words:** *GSTT1* null genotype, *GSTT1* deletion, *glutathione*, chromium metabolism, hexavalent chromium, chromium toxicity, chromium carcinogenesis



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**Hubungan Variasi Gen Glutathione S- Transferase T1 dengan Kadar Kromium Darah Pekerja Batik Kecamatan Lendah Kulon Progo**

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