Analisis Targeted Drug Sequencing pada Gen Resisten Rifampicin dan Isoniazid dari Sputum yang Telah Didekontaminasi dan Isolat Kultur Mycobacterium tuberculosis = Analysis of Targeted Drug Sequencing of Rifampicin and Isoniazid Resistance Genes from Decontaminated Sputum and Culture Isolates of Mycobacterium tuberculosis

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Abstrak

Tuberkulosis (TBC) masih menjadi penyebab utama kematian akibat penyakit menular oleh adanya infeksi. Rifampisin dan isoniazid adalah obat lini pertama yang paling efektif melawan infeksi Mycobacterium tuberculosis. Deteksi resistansi OAT yang tepat, akurat, dan komprehensif, serta pemilihan sampel diperlukan untuk memastikan diagnosis penyakit tuberkulosis pasien. Penelitian ini bertujuan untuk menganalisis perbandingan hasil targeted drug sequencing dari hasil dekontaminasi sputum dengan isolat Mycobacterium tuberculosis dan mengetahui kesesuaian DST fenotipik MGIT, genotipik GeneXpert dalam mendeteksi resistansi rifampisin dan isoniazid. Sampel penelitian ini adalah sampel sputum yang sudah ada hasil GeneXpert positif dan isolate kultur dengan hasil DST MGIT. Hasil dekontaminasi sputum langsung dan kultur positif dari sampel yang sama dilakukan targeted drug sequencing dengan Oxford Nanopore technology menggunakan flowcell MinION Mk1B. Hasil penelitian menunjukkan bahwa pada target gen rpoB pada 5 dari 6 sampel isolat kultur memberikan hasil gen resistan rpoB dan 1 undetermined. Pada sebagian besar dekontaminasi sputum yaitu 5 dari 6 sampel juga memberikan hasil resistan terhadap rpoB dan 1 dekontaminasi sputum yang undetermined. Hasil resistansi obat isoniazid didapatkan pada target gen inhA sebanyak 5 dari 6 isolat kultur memberikan hasil sensitif pada inhA dan 1 isolat undetermined. Sedangkan pada dekontaminasi sputum 4 dari 6 sampel memberikan hasil sensitif pada inhA dan 2 undetermined. Lalu, pada target gen katG terdapat 3 dari 6 isolat kultur memberikan hasil sensitif, 2 isolat resistan, dan 1 undetermined. Sedangkan pada dekontaminasi sputum memberikan 2 hasil sensitif, 2 hasil resistan, dan 2 hasil undetermined. Metode targeted drug sequencing dapat dilakukan dari sampel hasil dekontaminasi sputum dan isolat. Keberhasilan banyak didapatkan dari hasil kultur dibandingkan dekontaminasi sputum. Pemeriksaan dengan targeted drug sequencing memberikan hasil yang sesuai dengan hasil DST MGIT dan GeneXpert untuk deteksi gen resisten Rifampisin (rpoB) dan Isoniazid (inhA dan katG).

.....Tuberculosis (TBC) is still the main cause of death due to infectious diseases. Rifampicin and isoniazid are the most effective first-line drugs against Mycobacterium tuberculosis infection. Precise, accurate and comprehensive detection of OAT resistance, as well as sample selection are needed to confirm the patient's diagnosis of tuberculosis. This study aims to compare the results of targeted drug sequencing from sputum decontamination results with Mycobacterium tuberculosis isolates and determine the suitability of MGIT phenotypic and GeneXpert genotypic DST in detecting rifampicin and isoniazid resistance. The samples for this study were sputum samples that had positive GeneXpert results and culture isolates with DST MGIT results. The results of direct sputum decontamination and positive culture from the same sample were subjected to targeted drug sequencing with Oxford Nanopore technology using a MinION Mk1B flowcell. The results showed that for the rpoB gene target, the majority of culture isolates from 5 of the 6 culture

isolate samples gave rpoB resistance gene results and 1 was undetermined. In the majority of sputum decontamination, 5 out of 6 samples also gave resistance to rpoB and 1 sputum decontamination was undetermined. Isoniazid drug resistance results were obtained for the inhA gene target, 5 of the 6 culture isolates gave sensitive results for inhA and 1 isolate was undetermined. Meanwhile, in sputum decontamination, 4 of the 6 samples gave sensitive results for inhA and 2 were undetermined. Then, for the katG gene target, 3 of the 6 culture isolates gave sensitive results, 2 isolates were resistant, and 1 was undetermined. Meanwhile, sputum decontamination gave 2 sensitive results, 2 resistant results, and 2 undetermined results. The targeted drug sequencing method can be carried out from samples resulting from decontamination of sputum and isolates. Much success comes from culture results rather than sputum decontamination. Examination with targeted drug sequencing provided results that were in accordance with the results of DST MGIT and GeneXpert for the detection of Rifampicin (rpoB) and Isoniazid (inhA, and katG) resistance genes.