Deteksi Molekuler Tuberkulosis Ekstra-paru Gastrointestinal Menggunakan TaqMan qPCR dengan Gen Deteksi IS6110 = Molecular Detection of Extrapulmonary Gastrointestinal Tuberculosis using TaqMan qPCR with Detection Genes IS6110

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Abstrak

Kasus Tuberkulosis (TB) ekstra-paru, yaitu infeksi akibat bakteri Mycobacterium tuberculosis (Mtb) di luar jaringan paru-paru, telah mencakup 15% dari total populasi kasus secara global. Salah satu kasus TBEP yang mendominasi, terletak pada organ gastrointestinal (TBGI). Salah satu penyebab rendahnya laju diagnosis TB ekstra-paru disebabkan oleh beberapa tantangan saat identifikasi. Konfirmasi melalui metode bakteriologis menggunakan uji molekuler quantitative polymerase chain reaction (qPCR) dapat menjadi salah satu pendekatan dalam pengembangan alat uji diagnostik pendukung yang cepat. Tujuan penelitian ini adalah melakukan deteksi gen Insertion Sequence (IS) 6110 menggunakan metode qPCR, dan mengevaluasi nilai diagnostik qPCR IS6110 sebagai biomarka dalam diagnosis TBEP. Penelitian ini menetapkan 103 sampel jaringan biopsi berdasarkan gejala klinis menyerupai TBGI. Metode penelitian terdiri dari isolasi, kuantifikasi, dan amplifikasi DNA menggunakan kit TaqMan qPCR, serta melakukan analisis uji diagnostik berupa sensitivitas, spesifisitas, Positive Predictive Value (PPV), dan Negative Predictive Value (NPV). Keseluruhan kemurnian (A260/280) DNA memiliki nilai rerata yang baik yaitu 1,931. Hasil perhitungan uji diagnostik menunjukkan nilai sensitivitas 58,33% (14/24), spesifisitas 54,43% (43/79), dengan PPV 28%, dan NPV 81%. Penetapan nilai Limit of Detection (LOD) pada TaqMan qPCR mampu mendeteksi hingga 1,4 copies/L. Berdasarkan hasil penelitian, maka uji TaqMan qPCR dapat menjadi salah satu alat uji diagnosis pendukung pada penanganan TBGI. Akan tetapi, penelitian lebih lanjut menggunakan teknik sekuensing disarankan sebagai bentuk klarifikasi bahwa amplifikasi merupakan gen target yang diharapkan. .....Extra-pulmonary tuberculosis (EPTB), or Mycobacterium tuberculosis (Mtb) infection outside of the lung tissue, accounts for 15% of all tuberculosis cases worldwide. One of the most prevalent EPTB cases is gastrointestinal TB (GITB). The difficulty in identifying EPTB is one indicator of the diagnosis, especially in GITB cases. Therefore, confirmation through bacteriological methods with quantitative molecular polymerase chain reaction (qPCR) techniques can be one approach to developing rapid diagnostic test tools. This study aimed to detect the Insertion Sequence (IS) 6110 gene using the qPCR method and to evaluate the qPCR diagnostic testing to determine its validity in detecting the IS6110 as a TBEP biomarker gene. This study determined 103 biopsy samples based on the GITB clinical inclusion criteria. The research method consisted of isolation, DNA quantification, and DNA amplification with the TaqMan qPCR kit were utilized, followed by diagnostic testing (Sensitivity, Specificity, PPV, and NPV). DNA samples' overall purity (A260/280) had a good average value of 1,931. The results showed that TaqMan qPCR had a sensitivity of 58.33% (14/24), specificity reached 54.43% (43/79), with PPV 28%, and NPV 15,38%. The Limit of Detection (LOD) value in TaqMan qPCR may detect up to 1.4 copies/reaction. Based on the findings of this study, it can be concluded that the qPCR test method can be an option in supporting diagnostic test tools in the treatment of GITB. However, further research using sequencing techniques is suggested as a form of clarification that amplification is the expected gene target.