

## INTISARI

**Latar Belakang:** Hipertensi pulmonal (PH) adalah komplikasi umum pada anak dengan penyakit jantung bawaan (PJB). Baku emas diagnosis PH adalah kateterisasi jantung kanan yang invasif dan mahal. *Pulmonary Acceleration Time* (PAT) dan rasio PAT terhadap waktu ejeksi ventrikel kanan (PAT/RVET) melalui ekokardiografi berpotensi menjadi penanda non-invasif untuk deteksi dini PH.

**Tujuan:** Mengetahui nilai diagnostik PAT dan rasio PAT/RVET untuk mendiagnosis PH pada anak dengan PJB.

**Metode:** Penelitian ini adalah penelitian diagnostik potong lintang dilakukan di Rumah Sakit Dr. Sardjito, Yogyakarta, dari Juli hingga Oktober 2025. Subyek penelitian adalah anak-anak berusia 3 bulan hingga <18 tahun dengan PJB yang menjalani kateterisasi jantung kanan. Pengukuran ekokardiografi PAT dan RVET dilakukan <7 hari sebelum kateterisasi. Hipertensi pulmoner didefinisikan berdasarkan hasil kateterisasi (tekanan arteri pulmoner rata-rata [mPAP] >20 mmHg). Nilai titik potong untuk PAT dan rasio PAT/RVET ditentukan menggunakan analisis kurva karakteristik operasi penerima (ROC). Kinerja diagnostik dievaluasi melalui sensitivitas, spesifisitas, nilai prediksi positif dan negatif (NPP dan NPN), serta rasio kemungkinan.

**Hasil:** Dari 106 subyek yang terdaftar, 76 (71,7%) mengalami PH. Nilai titik potong PAT <120 ms menunjukkan sensitivitas 86,3% (95% IK 76,3-93,2), spesifisitas 89,9% (71,8-97,7), nilai prediksi positif (NPP) 95,5% (87,8-98,4), nilai prediksi negatif (NPN) 71,4% (58,1-81,9), *likelihood ratio* positif (LR+) 8,05 (2,75-23,56), dan LR negatif 0,15 (0,09-0,28). Rasio PAT/RVET <0,47 menunjukkan sensitivitas 82,2% (71,5-90,2), spesifisitas 67,9% (47,7-84,1), NPP 87,5% (79,4-92,0), dan NPN 59,4% (47,7-71,8), *likelihood ratio* positif (LR+) 2,56 (1,48-4,43), dan LR negatif 0,26 (0,15-0,46).

**Kesimpulan:** PAT dan rasio PAT/RVET memiliki nilai diagnostik yang baik sebagai penanda non-invasif hipertensi pulmonal pada anak dengan PJB.

**Kata Kunci:** Hipertensi pulmoner; penyakit jantung bawaan; ekokardiografi; akurasi diagnostik; kardiologi pediatri; Indonesia

## ABSTRACT

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**Background:** Delayed diagnosis and management of children with congenital heart disease/CHD result in serious complications, including pulmonary hypertension/PH. Heart catheterization as gold standard of diagnosing PH is invasive and limited in Indonesia. Pulmonary acceleration time (PAT) and PAT to right ventricular ejection time ratio (PAT/RVET) from echocardiography are non invasive tool for early detection in PH.

**Objective:** To determine the diagnostic value of PAT and PAT/RVET ratio for diagnosing pulmonary hypertension (PH) in children with CHD.

**Methods:** A cross-sectional diagnostic study was conducted at dr. Sardjito Hospital, Yogyakarta, from July to October 2025. Subjects were children aged 3 months to <18 years with left-to-right shunt CHD undergoing right heart catheterization. Echocardiographic measurements of PAT and RVET were performed <7 days before heart catheterization. Pulmonary hypertension was defined based on catheterization results (mean pulmonary artery pressure [mPAP] >20 mmHg). Cutoff values for PAT and the PAT/RVET ratio were determined using receiver operating characteristic (ROC) curve analysis. Diagnostic performance was evaluated through sensitivity, specificity, positive and negative predictive values (PPV and NPV), and likelihood ratios.

**Results:** Of 106 subjects enrolled, 76 (71.7%) had PH. A PAT cut-off value of <120 ms demonstrated sensitivity of 86.3% (95% CI 76.3-93.2), specificity of 89.9% (71.8-97.7), positive predictive value (PPV) of 95.5% (87.8-98.4), negative predictive value (NPV) of 71.4% (58.1-81.9), positive likelihood ratio (LR) 8.05 (2.75-23.56), and negative LR 0.15 (0.09-0.28). A PAT/RVET ratio of <0.47 showed sensitivity of 82.2% (71.5-90.2), specificity of 67.9% (47.7-84.1), PPV of 87.5% (79.4-92.0), and NPV of 59.4% (47.7-71.8), positive likelihood ratio (LR) 2.56 (1.48-4.43), and negative LR 0.26 (0.15-0.46).

**Conclusions:** Pulmonary acceleration time and PAT/RVET ratio are valid non-invasive markers with good diagnostic value for detecting pulmonary hypertension in children with left-to-right shunt CHD.

**Keywords:** pulmonary acceleration time; pulmonary hypertension; congenital heart disease;