

## INTISARI

**Latar Belakang:** *Corona Virus Disease 2019* (COVID-19) merupakan penyakit infeksi virus dengan tingkat penularan tinggi yang membutuhkan diagnosis cepat dan akurat. Pemeriksaan *real-time polymerase chain reaction* (RT-PCR) merupakan diagnostik baku emas, tetapi memiliki keterbatasan praktis dalam penerapannya. Alternatif berbasis *artificial intelligence* (AI) dengan analisis *chest x-ray* (CXR) diharapkan dapat membantu deteksi COVID-19. Software berbasis AI yang dipakai adalah *CAD4COVID-Xray* dengan metode *color heat-map* yang mendeteksi temuan kelainan pada data CXR untuk menghasilkan skor.

**Tujuan:** Menilai akurasi diagnosis AI *CAD4COVID-Xray* dan akurasi model skor prediksi COVID-19 kombinasi AI *CAD4COVID-Xray* dengan data klinis dan laboratorium dalam mendeteksi COVID-19.

**Metode:** Penelitian ini menggunakan metode analisis observasional dan desain penelitian *cross-sectional* dengan pengambilan data secara retrospektif menggunakan data rekam medis pasien COVID-19 yang dirawat di RSUP Dr. Sardjito pada Maret 2020–Maret 2023. Data yang diperlukan meliputi data CXR, klinis, dan laboratorium. Data CXR dianalisis oleh AI *CAD4COVID-Xray* yang menghasilkan dua skor, yaitu COVID-19 *probability score* dan *affected lung area* (ALA) *score*. Selanjutnya analisis dilakukan menggunakan analisis kurva *receiver operating characteristic* (ROC), multivariat regresi logistik metode *forward stepwise*, dan pengembangan model skor prediksi COVID-19 dengan validasi internal.

**Hasil:** COVID-19 *probability score* menunjukkan akurasi diagnosis yang sangat baik (AUC 0,940, sensitivitas 92,8%, spesifisitas 85,8%) dan berhubungan signifikan dengan hasil RT-PCR positif. Sebaliknya, ALA *score* menunjukkan ketidakmampuan dalam membedakan hasil positif dan negatif (AUC 0,121), tetapi juga berhubungan signifikan dengan hasil RT-PCR. Beberapa faktor klinis dan laboratorium juga berhubungan signifikan dengan hasil RT-PCR positif dan digabungkan dengan skor *CAD4COVID-Xray* dalam model skor prediksi COVID-19. Model skor prediksi ini menunjukkan akurasi yang juga sangat baik (AUC 0,929) dengan validasi internal.

**Kesimpulan:** COVID-19 *probability score* yang dihasilkan oleh AI *CAD4COVID-Xray* menunjukkan akurasi diagnosis yang sangat baik, sedangkan ALA *score* tidak layak digunakan. Selain itu, model skor prediksi COVID-19 kombinasi AI *CAD4COVID-Xray* dengan data klinis dan laboratorium juga menunjukkan akurasi yang sangat baik.

**Kata Kunci:** COVID-19, *artificial intelligence*, *chest x-ray*, akurasi diagnosis, model prediksi

## ABSTRACT

**Background:** Coronavirus Disease 2019 (COVID-19) is a highly contagious viral infection that requires rapid and accurate diagnosis. Real-time polymerase chain reaction (RT-PCR) testing is the gold standard for diagnosis, but it has practical limitations in its application. AI-based alternatives using chest X-ray (CXR) analysis are expected to aid in the detection of COVID-19. The AI-based software used is CAD4COVID-Xray with a color heat-map method that detects abnormalities in CXR data to generate a score.

**Objective:** Assessing the diagnostic accuracy of AI CAD4COVID-Xray and the accuracy of the COVID-19 prediction score model combining with AI CAD4COVID-Xray with clinical and laboratory data in detecting COVID-19.

**Methods:** This study used observational analysis methods and a cross-sectional research design with retrospective data collection using medical records of COVID-19 patients treated at Dr. Sardjito General Hospital from March 2020 to March 2023. The data required included CXR, clinical, and laboratory data. CXR data were analyzed using AI CAD4COVID-Xray, which generated two scores: the COVID-19 probability score and the affected lung area (ALA) score. Further analysis was performed using receiver operating characteristic (ROC) curve analysis, forward stepwise multivariate logistic regression, and the development of a COVID-19 prediction score model with internal validation.

**Results:** The COVID-19 probability score showed excellent diagnostic accuracy (AUC 0.940, sensitivity 92.8%, specificity 85.8%) and was significantly associated with positive RT-PCR results. In contrast, the ALA score showed an inability to distinguish between positive and negative results (AUC 0.121), but was also significantly associated with RT-PCR results. Several clinical and laboratory factors are also significantly associated with positive RT-PCR results and are combined with the CAD4COVID-Xray score in the COVID-19 prediction score model. This prediction score model also shows excellent accuracy (AUC 0.929) with internal validation.

**Conclusion:** The COVID-19 probability score generated by AI CAD4COVID-Xray shows excellent diagnostic accuracy, while the ALA score is not suitable for use. In addition, the COVID-19 prediction score model combining with AI CAD4COVID-Xray with clinical and laboratory data also shows excellent accuracy.

**Keywords:** COVID-19, artificial intelligence, chest x-ray, diagnostic accuracy, prediction model