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LETTER TO THE EDITOR

Original article: Soni M. Evaluation of eosinopenia as a diagnostic and prognostic indicator in COVID-19 infection. *Int J Lab Hematol*. 2020;00:1-5. https://doi.org/10.1111/ijlh.13425

Dear Editors,

Several reports have been published describing that eosinopenia is a common finding in COVID-19 patients.[1,2] In this journal, Soni[3] presented a very interesting study, showing that eosinopenia on admission is a reliable and convenient early marker for COVID-19 infection. The specificity was as high as 100% in this study population. The author states that these findings need to be corroborated with a larger, multicentre study. With regard to patient logistics (eg single-patient rooms) and laboratory costs, especially in low-resource settings, it would be of great value to have a fast alternative test for the SARS-CoV-2 reverse transcription polymerase chain reaction (RT-PCR).

In the southern part of the Netherlands, the first COVID-19 patients were admitted to hospitals in early March 2020. In the Dutch first wave, a high incidence rate was observed in the south-east where the three general hospitals (EH, JBH and SJG) participating in this study are located. The cell counts in these three hospitals were determined using the ADVIA 2120i haematology analyser (Siemens Healthineers, The Netherlands). The ADVIA 2120i haematology analyser accurately separates eosinophils from other leucocytes using peroxidase activity measurement and nuclear density cytograms. In line with the published study by Soni, patients with a positive test result of the SARS-CoV-2 RT-PCR were considered as confirmed COVID-19 cases. Although the performance of SARS-CoV-2 RT-PCR testing is highly accurate, a certain number of false-negative test results cannot be ruled out.[4]

Data at admission to the hospital were collected from the records of 2064 patients, including eosinophil count and result of SARS-CoV-2 RT-PCR (723 RT-PCR–positive; 1341 RT-PCR–negative). The mean eosinophil count in the confirmed COVID-19 patients was very low (0.03 × 109/L), but higher than the median reported by Soni (0.01 × 109/L). During 2019 (pre–COVID-19), the mean eosinophil count in our region was 0.200 × 109/L, and in our RT-PCR–negative group, 0.139 × 109/L, both lower than the median in the RT-PCR–negative group (0.25 × 109/L) reported by Soni.[2]

In Figure 1, the percentage of patients with an eosinophil count below the cut-off as proposed by Soni (0.05 × 109/L) is presented during 2019 (pre–COVID-19) until week 7 2021. Additionally, the percentage of weekly admissions of SARS-CoV-2 RT-PCR–positive patients is shown. There is a clear correlation between COVID-19 admissions and number of patients with very low eosinophil counts. It is shown that during the Dutch winter period in 2019 elevated number of low eosinophil counts can be observed as well. We speculate that this observed eosinopenia is a result of infection with other commonly occurring respiratory viruses.

As shown in Table 1, using the cut-off 0.05 × 109/L, the sensitivity was 83.3% (Soni study: 80.7%), but the specificity was merely 64.1% (Soni study: 100%). In our patient population, the PPV was 55.6% and NPV 87.7% (Soni study: 100% and 61.5%, respectively). The accuracy was 70.8% (Soni study: 85.2%). Unfortunately, we were not able to confirm the study findings published by Soni.[2] We notice that the separation of the RT-PCR–positive and RT-PCR–negative patient groups in our

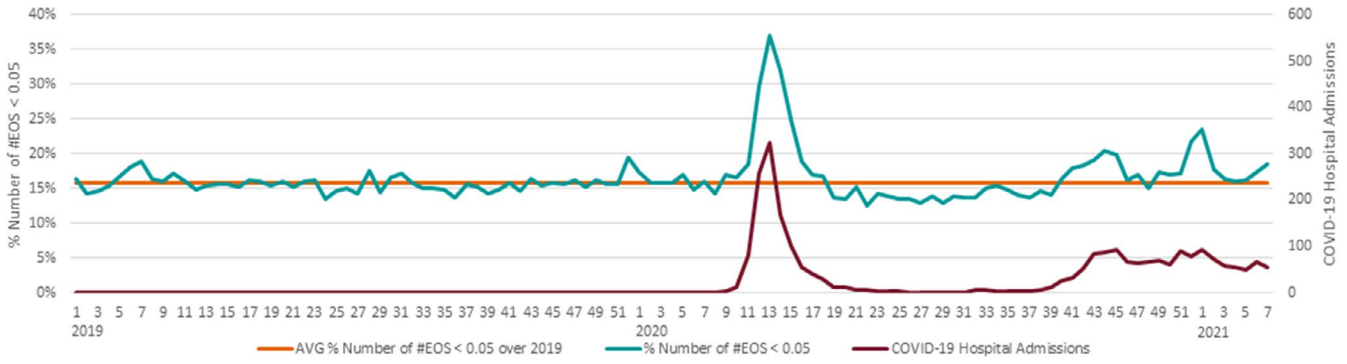

FIGURE 1 COVID-19 hospital admission and incidence of eosinopenia

	PCR +	PCR −	Total
#EOS <0.05	True positive	False positive	
	602	481	1083
#EOS >0.05	False negative	True negative	
	121	860	981
Total	723	1341	
	Sensitivity	83.3%	
	Specificity	64.1%	
	PPV	55.6%	
	NPV	87.7%	
	Accuracy	70.8%	
PCR +	Mean	0.030	
PCR −	Mean	0.139	
Normal	Mean	0.198	
	% EOS ≤ 0.05	1%	

TABLE 1 Statistical analysis of eosinopenia and SARS-CoV-2 RT-PCR

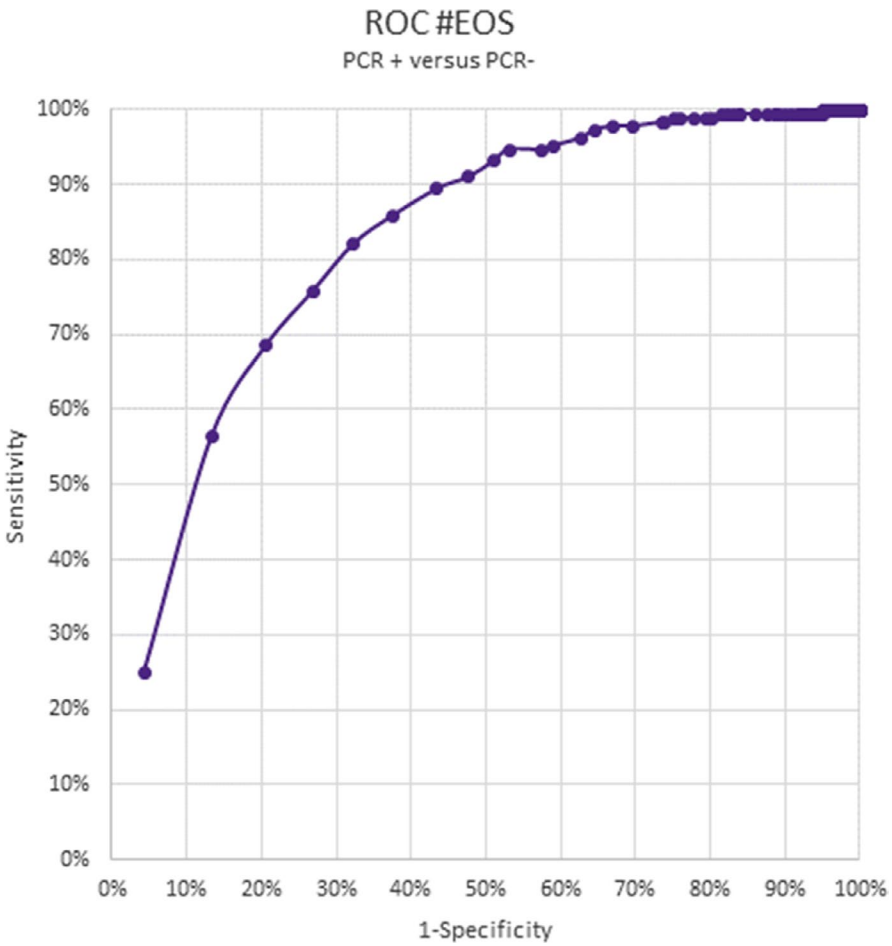

FIGURE 2 Receiver operating characteristic (ROC) curve of eosinopenia as an indicator for COVID-19 infection

study population is not as large as in the Indian study population. Perhaps the lower overall infection rate in the Netherlands leads to the diminished capability to use the cut-off for eosinophil counts as proposed by Soni. ROC analysis shows an area under the curve of 0.82 and, depending on the intended use, a proposed optimal cut-off of 0.02 × 109/L and 0.03 × 109/L (Figure 2). Data analysis shows the highest accuracy of 75.5% using a cut-off of 0.02 × 109/L, sensitivity of 68.6%, specificity of 79.5%, PPV of 65.6% and NPV of 81.5%. Although the test performance improves by using this lower cut-off point, the excellent specificity

found by Soni could not be reached. We conclude that in the Dutch population a very low eosinophil count can be helpful as a signal to (re)consider COVID-19 infections, but based upon the specificity the absolute eosinophil count cannot be used to replace the SARS-CoV-2 RT-PCR test.

KEYWORDS

COVID-19, diagnostic, eosinopenia, eosinophils, SARS-CoV-2 RT-PCR

CONFLICT OF INTEREST

The authors have no competing interests.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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