Letter to the Editor

Laura Pighi, Brandon M. Henry, Simone De Nitto, Gian Luca Salvagno and Giuseppe Lippi*

Reliability of a single-nostril nasopharyngeal swab for diagnosing SARS-CoV-2 infection

https://doi.org/10.1515/dx-2023-0014
Received February 4, 2023; accepted February 6, 2023;
published online February 20, 2023

Keywords: COVID-19; molecular testing; nasopharyngeal swab; SARS-CoV-2.

To the Editor,

Detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA is still considered the gold standard for diagnosing coronavirus disease 2019 (COVID-19) [1]. Specimen collection, which typically includes a combined naso- and oro-pharyngeal swab (NOS) taken from both nostrils [2], is often reported as discomforting by the patients, especially by those with anatomic problems (e.g., mucosal hypertrophy, septal spurs or deviation, nasal polyps, etc.) [3]. In this study, we compared the SARS-CoV-2 viral load measured after collecting a single nasopharyngeal swab from each nostril to that obtained from the standard recommend double-nostril NOS.

The study population consisted of 21 consecutive healthcare workers (median age 49 years, 67% females) undergoing routine molecular testing after being diagnosed with COVID-19 at the Pederzoli Hospital of Peschiera del Garda (Verona, Italy) between December 2022 and January 2023. Three upper respiratory specimens (UTM™ viral swab, Copan, Brescia, Italy) were collected from each subject by the same skilled healthcare operator, as follows: 1 single-nostril right nasopharyngeal swab, 1 single-nostril left nasopharyngeal swab (the sequence of the first sample was randomized 1:1 between the right and left nostrils according to even and uneven patient numbers), followed by a double-nostril NOS. SARS-CoV-2 RNA was assayed with Xpert Xpress SARS-CoV-2 (Cepheid, Sunnyvale, CA, USA), a real-time reverse transcription polymerase chain reaction (RT-PCR) test developed for quantitative detection of SARS-CoV-2 nucleocapsid (*N2*), envelope (*E*), and RNA-dependent RNA polymerase (*RdRP*) genes [4]. The mean of the cycle threshold (Ct) values obtained on the *N2* and *E* genes from each collection was calculated and individual results were expressed as mean Ct values of the 2 genes. Results of all measurements were expressed as median and interquartile range (IQR). The difference between values were analyzed with Mann–Whitney paired test, using Analyse-it (Analyse-it Software Ltd, Leeds, UK). This study was part of routine clinical laboratory operations for SARS-CoV-2 screening and diagnosis at the local facility, such that patient informed consent and Ethical Committee approval were not required and in keeping with current guidance that this information is not required when collecting laboratory management data not associated with patient information (i.e., test utilization) [5]. This study was conducted in accordance with the Declaration of Helsinki, under the terms of relevant local legislation.

As shown in Figure 1, no statistically significant differences were found between the median Ct values of the first (28.0; IQR; 23.3–31.5) and second (28.0; IQR; 23.3–32.6) single-nostril swabs taken from either nostril (p=0.472). No statistically significant differences were also observed in the median Ct values of NOS (28.9; IQR, 22.9–30.7) and that of the first single-nostril (p=0.236) or the second single-nostril (p=0.336) nasopharyngeal samples. No statistically significant difference could also be found in the median Ct values of single-nostril nasopharyngeal samples collected from the right (28.0; IQR, 23.0–31.7) and left (27.8; IQR, 23.5–31.9; p=0.325) nostrils.

To the best of our knowledge, only another study has assessed SARS-CoV-2 Ct values in single-nostril nasopharyngeal specimens. Briefly, Azeem et al. enrolled 10 consecutive patients, who underwent single nasal swabbing from either nostril [6]. Overall, no statistically significant differences in the mean SARS-CoV-2 Ct values were found in specimens

***Corresponding author: Prof. Giuseppe Lippi**, Section of Clinical Biochemistry, University Hospital of Verona, Piazzale L.A. Scuro, 10, 37134 Verona, Italy, Phone: 0039 045 8122970, Fax: 0039 045 8124308, E-mail: giuseppe.lippi@univr.it. https://orcid.org/0000-0001-9523-9054
Laura Pighi, Simone De Nitto and Gian Luca Salvagno, Section of Clinical Biochemistry, University of Verona, Verona, Italy; and Service of Laboratory Medicine, Pederzoli Hospital, Peschiera del Garda, Italy
Brandon M. Henry, Clinical Laboratory, Division of Nephrology and Hypertension, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

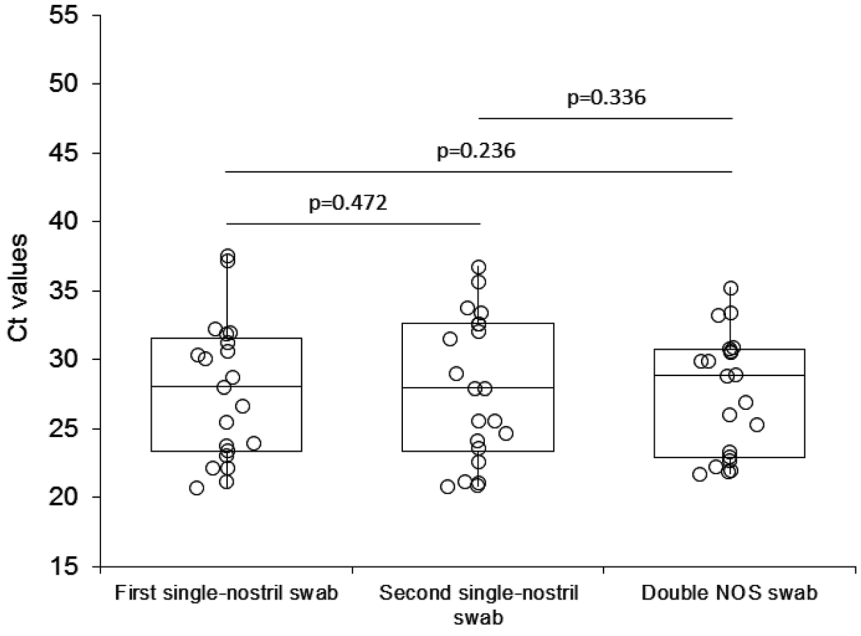

Figure 1: Median (and interquartile range; IQR) of SARS-CoV-2 cycle threshold (Ct) values in the first single nasopharyngeal swab, in the second single nasopharyngeal swab and in the double-nostril naso- and oro-pharyngeal swab (NOS). NOS, naso- and oro-pharyngeal swab.

collected from the left and right naris (22.2 vs. 22.7, p=0.346). To this end, the results of our study confirm that collection of a nasopharyngeal swab from a single nostril may be a reliable and less invasive alternative for diagnosing SARS-CoV-2 infection than collecting the standard double-nostril NOS, thus contributing to reduce discomfort and potentially enhance testing compliance.

Research funding: None declared.

Author contribution: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Competing interests: Authors state no conflict of interest.

Informed consent: Informed consent was obtained from all individuals included in this study.

Ethical approval: The local Institutional Review Board deemed the study exempt from review.

Data availability: The data will be available upon reasonable request to the corresponding author.

References

1. Lippi G, Favresse J, Gromiha MM, SoRelle JA, Plebani M, Henry BM. Ad interim recommendations for diagnosing SARS-CoV-2 infection by the IFCC SARS-CoV-2 variants working group. Clin Chem Lab Med 2022;60: 975–81.
2. Marty FM, Chen K, Verrill KA. How to obtain a nasopharyngeal swab specimen. N Engl J Med 2020;382:e76.
3. Marra P, Colacurcio V, Bisogno A, De Luca P, Calvanese M, Petrosino M, et al. Evaluation of discomfort in nasopharyngeal swab specimen collection for SARS-CoV-2 diagnosis. Clin Ter 2021;172:448–52.
4. Loeffelholz MJ, Alland D, Butler-Wu SM, Pandey U, Perno CF, Nava A, et al. Multicenter evaluation of the cepheid Xpert xpress SARS-CoV-2 test. J Clin Microbiol 2020;58:e00926–20.
5. Borovecki A, Mlinaric A, Horvat M, Supak Smolcic V. Informed consent and ethics committee approval in laboratory medicine. Biochem Med 2018;28:030201.
6. Azeem A, Walters RW, Cavalieri SJ, Quimby DS. Reproducibility of cycle threshold values from severe acute respiratory coronavirus virus 2 (SARS-CoV-2) reverse-transcription polymerase chain reaction (RT-PCR) assays. Infect Control Hosp Epidemiol 2022:1–2. https://doi.org/10.1017/ice.2022.298 [Epub ahead of print].