Systematic Review

Supplementary Files

Diagnosis of SARS-Cov-2 Infection by RT-PCR Using Specimens Other Than Naso- And Oropharyngeal Swabs: A Systematic Review and Meta-Analysis

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Supplementary S1. PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	4
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	4
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	4
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	5
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	5
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	16
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	16
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	17
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	18
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	19
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	21

NA – Not applicable

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

Supplementary S2. List of potentially relevant studies not included in the systematic review, along with the reasons for exclusion.

#	Reference	Reason for exclusion
1	Alsuliman T, Sulaiman R, Ismail S, Srour M, Alrstom A. COVID-19 paraclinical diagnostic tools: Updates and future trends. Curr Res Transl Med. 2020 Aug;68(3):83-91. doi: 10.1016/j.retram.2020.06.001.	Review
2	Altawalah H, AlHuraish F, Alkandari WA, Ezzikouri S. Saliva specimens for detection of severe acute respiratory syndrome coronavirus 2 in Kuwait: A cross-sectional study. J Clin Virol. 2020 Nov;132:104652. doi: 10.1016/j.jcv.2020.104652.	Unclear results
3	Arora R, Goel R, Kumar S, Chhabra M, Saxena S, Manchanda V, Pumma P. Evaluation of SARS-CoV-2 in Tears of Patients with Moderate to Severe COVID-19. Ophthalmology. 2020 Aug 31:S0161-6420(20)30847-2. doi: 10.1016/j.ophtha.2020.08.029.	No control
4	Azzi L, Carcano G, Gianfagna F, Grossi P, Gasperina DD, Genoni A, Fasano M, Sessa F, Tettamanti L, Carinci F, Maurino V, Rossi A, Tagliabue A, Baj A. Saliva is a reliable tool to detect SARS-CoV-2. J Infect. 2020 Jul;81(1):e45-e50. doi: 10.1016/j.jinf.2020.04.005.	Review
5	Bullis SSM, Crothers JW, Wayne S, Hale AJ. A cautionary tale of false-negative nasopharyngeal COVID-19 testing. IDCases. 2020 May 5;20:e00791. doi: 10.1016/j.idcr.2020.e00791.	Case report
6	Bwire GM, Majigo MV, Njiro BJ, Mawazo A. Detection profile of SARS-CoV-2 using RT-PCR in different types of clinical specimens: A systematic review and meta-analysis. J Med Virol. 2020 Jul 24:10.1002/jmv.26349. doi: 10.1002/jmv.26349.	Review
7	Byrne RL, Kay GA, Kontogianni K, Aljayyoussi G, Brown L, Collins AM, Cuevas LE, Ferreira DM, Fraser AJ, Garrod G, Hill H, Hughes GL, Menzies S, Mitsi E, Owen SI, Patterson EI, Williams CT, Hyder-Wright A, Adams ER, Cubas-Atienzar AI. Saliva Alternative to Upper Respiratory Swabs for SARS-CoV-2 Diagnosis. Emerg Infect Dis. 2020 Nov;26(11):2770-2771. doi: 10.3201/eid2611.203283.	Letter to the editor
8	Cevik M, Bamford CGG, Ho A. COVID-19 pandemic-a focused review for clinicians. Clin Microbiol Infect. 2020 Jul;26(7):842-847. doi: 10.1016/j.cmi.2020.04.023.	Review
9	Chen L, Lou J, Bai Y, Wang M. COVID-19 Disease With Positive Fecal and Negative Pharyngeal and Sputum Viral Tests. Am J Gastroenterol. 2020 May;115(5):790. doi: 10.14309/ajg.0000000000000610.	Letter to the editor
10	Chen Y, Chen L, Deng Q, Zhang G, Wu K, Ni L, Yang Y, Liu B, Wang W, Wei C, Yang J, Ye G, Cheng Z. The presence of SARS-CoV-2 RNA in the feces of COVID-19 patients. J Med Virol. 2020 Jul;92(7):833-840. doi: 10.1002/jmv.25825.	No information regardinbg TP, FN, TN and FP
11	Chen Z, Tong L, Zhou Y, Hua C, Wang W, Fu J, Shu Q, Hong L, Xu H, Xu Z, Chen Y, Mao Y, Ye S, Wu X, Wang L, Luo Y, Zou X, Tao X, Zhang Y. Childhood COVID-19: a multicentre retrospective study. Clin Microbiol Infect. 2020 Sep;26(9):1260.e1-1260.e4. doi: 10.1016/j.cmi.2020.06.015.	One single samples
12	Cheng VCC, Wong SC, Chen JHK, Yip CCY, Chuang VWM, Tsang OTY, Sridhar S, Chan JFW, Ho PL, Yuen KY. Escalating infection control response to the rapidly evolving epidemiology of the coronavirus disease 2019 (COVID-19) due to SARS-CoV-2 in Hong Kong. Infect Control Hosp Epidemiol. 2020 May;41(5):493-498. doi: 10.1017/ice.2020.58.	Case report

13	Cho SM, Ha GY. A Case of COVID-19 in a 45-Day-Old Infant with Persistent Fecal Virus Shedding for More Than 12 Weeks. Yonsei Med J. 2020 Oct;61(10):901-903. doi: 10.3349/ymj.2020.61.10.901.	Case report
14	Chong CY, Kam KQ, Li J, Maiwald M, Loo LH, Nadua KD, Tan NWH, Yung CF, Thoon KC. Saliva is not a useful diagnostic specimen in children with Coronavirus Disease 2019. Clin Infect Dis. 2020 Sep 14:ciaa1376. doi: 10.1093/cid/ciaa1376.	Letter to the editor
15	COVID-19 Investigation Team. Clinical and virologic characteristics of the first 12 patients with coronavirus disease 2019 (COVID-19) in the United States. Nat Med. 2020 Jun;26(6):861-868. doi: 10.1038/s41591-020-0877-5.	Letter to the editor
16	Czumbel LM, Kiss S, Farkas N, Mandel I, Hegyi A, Nagy Á, Lohinai Z, Szakács Z, Hegyi P, Steward MC, Varga G. Saliva as a Candidate for COVID-19 Diagnostic Testing: A Meta-Analysis. Front Med (Lausanne). 2020 Aug 4;7:465. doi: 10.3389/fmed.2020.00465.	Review
17	Jones DL, Baluja MQ, Graham DW, Corbishley A, McDonald JE, Malham SK, Hillary LS, Connor TR, Gaze WH, Moura IB, Wilcox MH, Farkas K. Shedding of SARS-CoV-2 in feces and urine and its potential role in person-to-person transmission and the environment-based spread of COVID-19. Sci Total Environ. 2020 Dec 20;749:141364. doi: 10.1016/j.scitotenv.2020.141364.	Review
18	Sakanashi D, Asai N, Nakamura A, Miyazaki N, Kawamoto Y, Ohno T, Yamada A, Koita I, Suematsu H, Hagihara M, Shiota A, Kurumiya A, Sakata M, Kato S, Muramatsu Y, Koizumi Y, Kishino T, Ohashi W, Yamagishi Y, Mikamo H. Comparative evaluation of nasopharyngeal swab and saliva specimens for the molecular detection of SARS-CoV-2 RNA in Japanese patients with COVID-19. J Infect Chemother. 2021 Jan;27(1):126-129. doi: 10.1016/j.jiac.2020.09.027.	Only saliva samples
19	Dang Y, Liu N, Tan C, Feng Y, Yuan X, Fan D, Peng Y, Jin R, Guo Y, Lou J. Comparison of qualitative and quantitative analyses of COVID-19 clinical samples. Clin Chim Acta. 2020 Nov;510:613-616. doi: 10.1016/j.cca.2020.08.033.	No information regardinbg TP, FN, TN and FP
20	Du W, Yu J, Liu X, Chen H, Lin L, Li Q. Persistence of SARS-CoV-2 virus RNA in feces: A case series of children. J Infect Public Health. 2020 Jul;13(7):926-931. doi: 10.1016/j.jiph.2020.05.025.	Case report
21	Fakheran O, Dehghannejad M, Khademi A. Saliva as a diagnostic specimen for detection of SARS-CoV-2 in suspected patients: a scoping review. Infect Dis Poverty. 2020 Jul 22;9(1):100. doi: 10.1186/s40249-020-00728-w.	Review
22	Fan H, Yu X, Fu X, Zhu H, Lv Z, Yi W, Zhang Q. Clinical implications of different specimen types for nucleic acid testing in two cases of COVID-19. J Int Med Res. 2020 Aug;48(8):300060520949067. doi: 10.1177/0300060520949067.	Case report
23	Fukumoto T, Iwasaki S, Fujisawa S, Hayasaka K, Sato K, Oguri S, Taki K, Nakakubo S, Kamada K, Yamashita Y, Konno S, Nishida M, Sugita J, Teshima T. Efficacy of a novel SARS-CoV-2 detection kit without RNA extraction and purification. Int J Infect Dis. 2020 Sep;98:16-17. doi: 10.1016/j.ijid.2020.06.074.	Comparison between different methods
24	Gupta S, Parker J, Smits S, Underwood J, Dolwani S. Persistent viral shedding of SARS-CoV-2 in faeces - a rapid review. Colorectal Dis. 2020 Jun;22(6):611-620. doi: 10.1111/codi.15138.	Review
25	Kaya H, Çalışkan A, Okul M, Sarı T, Akbudak İH. Detection of SARS-CoV-2 in the tears and conjunctival secretions of Coronavirus disease	Case series

	2019 patients. J Infect Dev Ctries. 2020 Sep 30;14(9):977-981. doi: 10.3855/jidc.13224.	
26	Hamid H, Khurshid Z, Adanir N, Zafar MS, Zohaib S. COVID-19 Pandemic and Role of Human Saliva as a Testing Biofluid in Point-of-Care Technology. Eur J Dent. 2020 Jun 3. doi: 10.1055/s-0040-1713020.	Review
27	Han MS, Choi EH, Chang SH, Jin BL, Lee EJ, Kim BN, Kim MK, Doo K, Seo JH, Kim YJ, Kim YJ, Park JY, Suh SB, Lee H, Cho EY, Kim DH, Kim JM, Kim HY, Park SE, Lee JK, Jo DS, Cho SM, Choi JH, Jo KJ, Choe YJ, Kim KH, Kim JH. Clinical Characteristics and Viral RNA Detection in Children With Coronavirus Disease 2019 in the R	Comparison between symptomatic and asymptomatic patients
28	Han MS, Seong MW, Heo EY, Park JH, Kim N, Shin S, Cho SI, Park SS, Choi EH. Sequential Analysis of Viral Load in a Neonate and Her Mother Infected With Severe Acute Respiratory Syndrome Coronavirus 2. Clin Infect Dis. 2020 Nov 19;71(16):2236-2239. doi: 10.1093/cid/ciaa447.	Case series
29	Han MS, Seong MW, Kim N, Shin S, Cho SI, Park H, Kim TS, Park SS, Choi EH. Viral RNA Load in Mildly Symptomatic and Asymptomatic Children with COVID-19, Seoul, South Korea. Emerg Infect Dis. 2020 Oct;26(10):2497-2499. doi: 10.3201/eid2610.202449.	Letter to the editor
30	Harikrishnan P. Saliva as a Potential Diagnostic Specimen for COVID-19 Testing. J Craniofac Surg. 2020 Sep;31(6):e653-e655. doi: 10.1097/SCS.0000000000006724.	No results
31	Hinojosa-Velasco A, de Oca PVB, García-Sosa LE, Mendoza-Durán JG, Pérez-Méndez MJ, Dávila-González E, Ramírez-Hernández DG, García-Mena J, Zárate-Segura P, Reyes-Ruiz JM, Bastida-González F. A case report of newborn infant with severe COVID-19 in Mexico: Detection of SARS-CoV-2 in human breast milk and stool. Int J Infect Dis. 2020 Nov;100:21-24. doi: 10.1016/j.ijid.2020.08.055.	Case report
32	Hu X, Deng Q, Li J, Chen J, Wang Z, Zhang X, Fang Z, Li H, Zhao Y, Yu P, Li W, Wang X, Li S, Zhang L, Hou T. Development and Clinical Application of a Rapid and Sensitive Loop-Mediated Isothermal Amplification Test for SARS-CoV-2 Infection. mSphere. 2020 Aug 26;5(4):e00808-20. doi: 10.1128/mSphere.00808-20.	Comparison between different methods
33	Huang CG, Lee KM, Hsiao MJ, Yang SL, Huang PN, Gong YN, Hsieh TH, Huang PW, Lin YJ, Liu YC, Tsao KC, Shih SR. Culture-Based Virus Isolation To Evaluate Potential Infectivity of Clinical Specimens Tested for COVID-19. J Clin Microbiol. 2020 Jul 23;58(8):e01068-20. doi: 10.1128/JCM.01068-20.	Genetic comparation
34	Huang JT, Ran RX, Lv ZH, Feng LN, Ran CY, Tong YQ, Li D, Su HW, Zhu CL, Qiu SL, Yang J, Xiao MY, Liu MJ, Yang YT, Liu SM, Li Y. Chronological Changes of Viral Shedding in Adult Inpatients With COVID-19 in Wuhan, China. Clin Infect Dis. 2020 Nov 19;71(16):2158-2166. doi: 10.1093/cid/ciaa631.	Fecal and urine samples mixed in the same analysis
35	Inomata T, Kitazawa K, Kuno T, Sung J, Nakamura M, Iwagami M, Takagi H, Midorikawa-Inomata A, Zhu J, Fujimoto K, Okumura Y, Miura M, Fujio K, Hirosawa K, Akasaki Y, Kuwahara M, Dana R, Murakami A. Clinical and Prodromal Ocular Symptoms in Coronavirus Disease: A Systematic Review and Meta-Analysis. Invest Ophthalmol Vis Sci. 2020 Aug 3;61(10):29. doi: 10.1167/iovs.61.10.29.	Review
36	Iwasaki S, Fujisawa S, Nakakubo S, Kamada K, Yamashita Y, Fukumoto T, Sato K, Oguri S, Taki K, Senjo H, Sugita J, Hayasaka K, Konno S, Nishida M, Teshima T. Comparison of SARS-CoV-2 detection in nasopharyngeal swab and saliva. J Infect. 2020 Aug;81(2):e145-e147. doi: 10.1016/j.jinf.2020.05.071.	Letter to the editor

37	Jeong HW, Kim SM, Kim HS, Kim YI, Kim JH, Cho JY, Kim SH, Kang H, Kim SG, Park SJ, Kim EH, Choi YK. Viable SARS-CoV-2 in various specimens from COVID-19 patients. Clin Microbiol Infect. 2020 Nov;26(11):1520-1524. doi: 10.1016/j.cmi.2020.07.020.	Case report
38	Jones DL, Baluja MQ, Graham DW, Corbishley A, McDonald JE, Malham SK, Hillary LS, Connor TR, Gaze WH, Moura IB, Wilcox MH, Farkas K. Shedding of SARS-CoV-2 in feces and urine and its potential role in person-to-person transmission and the environment-based spread of COVID-19. Sci Total Environ. 2020 Dec 20;749:141364. doi: 10.1016/j.scitotenv.2020.141364.	Review
39	Kam KQ, Yung CF, Maiwald M, Chong CY, Soong HY, Loo LH, Tan NWH, Li J, Nadua KD, Thoon KC. Clinical Utility of Buccal Swabs for Severe Acute Respiratory Syndrome Coronavirus 2 Detection in Coronavirus Disease 2019-Infected Children. J Pediatric Infect Dis Soc. 2020 Jul 13;9(3):370-372. doi: 10.1093/jpids/piaa068.	Missing information
40	Mehwash Kashif, Sana Iqbal, Muhammad Abdullah KamranWhether Human Saliva a Useful Tool for the Diagnosis of COVID-19, J Res Med Dent Sci, 2020, 8(5): 74-76	Commentary
41	Khoury NC, Russi TJ. A case of gastrointestinal-predominant COVID-19 demonstrates value of stool PCR test. J Med Virol. 2020 Aug 20:10.1002/jmv.26448. doi: 10.1002/jmv.26448.	Letter to the editor
42	Kim JM, Kim HM, Lee EJ, Jo HJ, Yoon Y, Lee NJ, Son J, Lee YJ, Kim MS, Lee YP, Chae SJ, Park KR, Cho SR, Park S, Kim SJ, Wang E, Woo S, Lim A, Park SJ, Jang J, Chung YS, Chin BS, Lee JS, Lim D, Han MG, Yoo CK. Detection and Isolation of SARS-CoV-2 in Serum, Urine, and Stool Specimens of COVID-19 Patients from the R	Missing information
43	Kipkorir V, Cheruiyot I, Ngure B, Misiani M, Munguti J. Prolonged SARS-CoV-2 RNA detection in anal/rectal swabs and stool specimens in COVID-19 patients after negative conversion in nasopharyngeal RT-PCR test. J Med Virol. 2020 Nov;92(11):2328-2331. doi: 10.1002/jmv.26007.	Letter to the editor
44	Kunz Y, Horninger W, Pinggera GM. Are urologists in trouble with SARS-CoV-2? Reflections and recommendations for specific interventions. BJU Int. 2020 Dec;126(6):670-678. doi: 10.1111/bju.15141.	Review
45	Lescure FX, Bouadma L, Nguyen D, Parisey M, Wicky PH, Behillil S, Gaymard A, Bouscambert-Duchamp M, Donati F, Le Hingrat Q, Enouf V, Houhou-Fidouh N, Valette M, Mailles A, Lucet JC, Mentre F, Duval X, Descamps D, Malvy D, Timsit JF, Lina B, van-der-Werf S, Yazdanpanah Y. Clinical and virological data of the first cases of COVID-19 in Europe: a case series. Lancet Infect Dis. 2020 Jun;20(6):697-706. doi: 10.1016/S1473-3099(20)30200-0.	One single samples
46	Li J, Feng J, Liu TH, Xu FC, Song GQ. An infant with a mild SARS-CoV-2 infection detected only by anal swabs: a case report. Braz J Infect Dis. 2020 May-Jun;24(3):247-249. doi: 10.1016/j.bjid.2020.04.009.	Case report
47	Liu J, Xiao Y, Shen Y, Shi C, Chen Y, Shi P, Gao Y, Wang Y, Lu B. Detection of SARS-CoV-2 by RT-PCR in anal from patients who have recovered from coronavirus disease 2019. J Med Virol. 2020 Oct;92(10):1769-1771. doi: 10.1002/jmv.25875.	Letter to the editor
48	Liu R, Han H, Liu F, Lv Z, Wu K, Liu Y, Feng Y, Zhu C. Positive rate of RT-PCR detection of SARS-CoV-2 infection in 4880 cases from one hospital in Wuhan, China, from Jan to Feb 2020. Clin Chim Acta. 2020 Jun;505:172-175. doi: 10.1016/j.cca.2020.03.009.	No information regardinbg TP, FN, TN and FP
49	Lübke N, Senff T, Scherger S, Hauka S, Andrée M, Adams O, Timm J, Walker A. Extraction-free SARS-CoV-2 detection by rapid RT-qPCR	No information regardinbg

	universal for all primary respiratory materials. J Clin Virol. 2020 Sep;130:104579. doi: 10.1016/j.jcv.2020.104579.	TP, FN, TN and FP
50	Ma X, Su L, Zhang Y, Zhang X, Gai Z, Zhang Z. Do children need a longer time to shed SARS-CoV-2 in stool than adults? J Microbiol Immunol Infect. 2020 Jun;53(3):373-376. doi: 10.1016/j.jmii.2020.03.010.	Lack of negative cases
51	Martinez RM. Clinical Samples for SARS-CoV-2 Detection: Review of the Early Literature. Clin Microbiol Newsl. 2020 Aug 1;42(15):121-127. doi: 10.1016/j.clinmicnews.2020.07.001.	Review
52	McCormick-Baw C, Morgan K, Gaffney D, Cazares Y, Jaworski K, Byrd A, Molberg K, Cavuoti D. Saliva as an Alternate Specimen Source for Detection of SARS-CoV-2 in Symptomatic Patients Using Cepheid Xpert Xpress SARS-CoV-2. J Clin Microbiol. 2020 Jul 23;58(8):e01109-20. doi: 10.1128/JCM.01109-20.	Letter to the editor
53	Morone G, Palomba A, Iosa M, Caporaso T, De Angelis D, Venturiero V, Savo A, Coiro P, Carbone D, Gimigliano F, Iolascon G, Paolucci S. Incidence and Persistence of Viral Shedding in COVID-19 Post-acute Patients With Negativized Pharyngeal Swab: A Systematic Review. Front Med (Lausanne). 2020 Aug 28;7:562. doi: 10.3389/fmed.2020.00562.	Review
54	Nagura-Ikeda M, Imai K, Tabata S, Miyoshi K, Murahara N, Mizuno T, Horiuchi M, Kato K, Imoto Y, Iwata M, Mimura S, Ito T, Tamura K, Kato Y. Clinical Evaluation of Self-Collected Saliva by Quantitative Reverse Transcription-PCR (RT-qPCR), Direct RT-qPCR, Reverse Transcription-Loop-Mediated Isothermal Amplification, and a Rapid Antigen Test To Diagnose COVID-19. J Clin Microbiol. 2020 Aug 24;58(9):e01438-20. doi: 10.1128/JCM.01438-20.	Comparison between different methods
55	Opota O, Brouillet R, Greub G, Jaton K. Comparison of SARS-CoV-2 RT-PCR on a high-throughput molecular diagnostic platform and the cobas SARS-CoV-2 test for the diagnostic of COVID-19 on various clinical samples. Pathog Dis. 2020 Nov 11;78(8):ftaa061. doi: 10.1093/femspd/ftaa061.	No information regardinbg TP, FN, TN and FP
56	Opota O, Brouillet R, Greub G, Jaton K. Comparison of SARS-CoV-2 RT-PCR on a high-throughput molecular diagnostic platform and the cobas SARS-CoV-2 test for the diagnostic of COVID-19 on various clinical samples. Pathog Dis. 2020 Nov 11;78(8):ftaa061. doi: 10.1093/femspd/ftaa061.	Comparison between different methods
57	Ozma MA, Maroufi P, Khodadadi E, Köse Ş, Esposito I, Ganbarov K, Dao S, Esposito S, Dal T, Zeinalzadeh E, Kafil HS. Clinical manifestation, diagnosis, prevention and control of SARS-CoV-2 (COVID-19) during the outbreak period. Infez Med. 2020 Ahead of print Jun 1;28(2):153-165.	Review
58	Ozturker ZK. Conjunctivitis as sole symptom of COVID-19: A case report and review of literature. Eur J Ophthalmol. 2020 Jul 24:1120672120946287. doi: 10.1177/1120672120946287.	Case report
59	Pan Y, Long L, Zhang D, Yuan T, Cui S, Yang P, Wang Q, Ren S. Potential False-Negative Nucleic Acid Testing Results for Severe Acute Respiratory Syndrome Coronavirus 2 from Thermal Inactivation of Samples with Low Viral Loads. Clin Chem. 2020 Jun 1;66(6):794-801. doi: 10.1093/clinchem/hvaa091.	Comparison between different methods
60	Park SK, Lee CW, Park DI, Woo HY, Cheong HS, Shin HC, Ahn K, Kwon MJ, Joo EJ. Detection of SARS-CoV-2 in Fecal Samples From Patients With Asymptomatic and Mild COVID-19 in Korea. Clin Gastroenterol Hepatol. 2020 Jun 10:S1542-3565(20)30777-1. doi: 10.1016/j.cgh.2020.06.005.	Only fecal samples

61	Petrovan V, Vrajmasu V, Bucur AC, Soare DS, Radu E, Dimon P, Zaulet M. Evaluation of Commercial qPCR Kits for Detection of SARS-CoV-2 in Pooled Samples. Diagnostics (Basel). 2020 Jul 11;10(7):472. doi: 10.3390/diagnostics10070472.	Comparison between different methods
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63	Ren JG, Li DY, Wang CF, Wu JH, Wang Y, Sun YJ, Zhang Q, Wang YY, Chang XJ. Positive RT-PCR in urine from an asymptomatic patient with novel coronavirus 2019 infection: a case report. Infect Dis (Lond). 2020 Aug;52(8):571-574. doi: 10.1080/23744235.2020.1766105.	Letter to the editor
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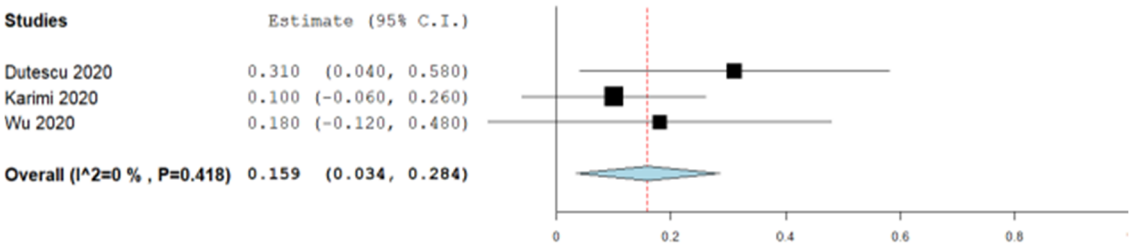
Supplementary S3. Methodological quality of the included studies (QUADAS-2).

Supplementary S4. Meta-regressions.

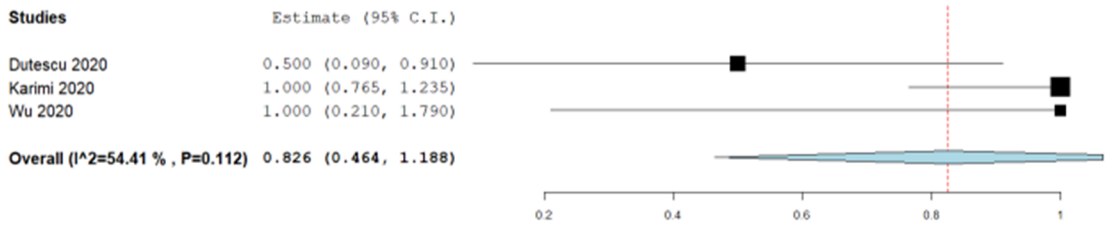
	Sensitivity		Specificity	
Index Specimen	**Coefficient (SE)**	**p-value**	**Coefficient (SE)**	**p-value**
Saliva				
M/F Ratio	0.00 (0.04)	0.994	0.01 (0.02)	0.441
N	0.00 (0.00)	0.518	**0.00 (0.00)**	**0.034**
DTS/POS				
M/F Ratio	-0.31 (0.21)	0.132	**-3.40 (0.99)**	**<0.001**
N	-0.00 (0.00)	0.607	0.00 (0.00)	0.109
Tears				
M/F Ratio	-0.19 (0.15)	0.198	**0.47 (0.23)**	**0.037**
N	-0.01 (0.00)	0.264	0.01 (0.01)	0.085
Feces				
M/F Ratio	-0.48 (0.36)	0.184	-0.99 (1.00)	0.321
N	-0.07 (0.184)	0.184	-0.14 (0.14)	0.321

M/F – Male/Female, SE – Standard Error, DTS/POS – Depp throat saliva/Posterior Oral Saliva

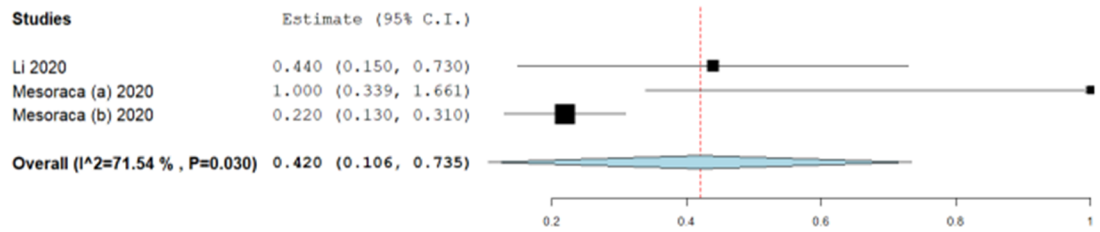
Supplementary S5. Subgroup analysis on tears sensitivity.



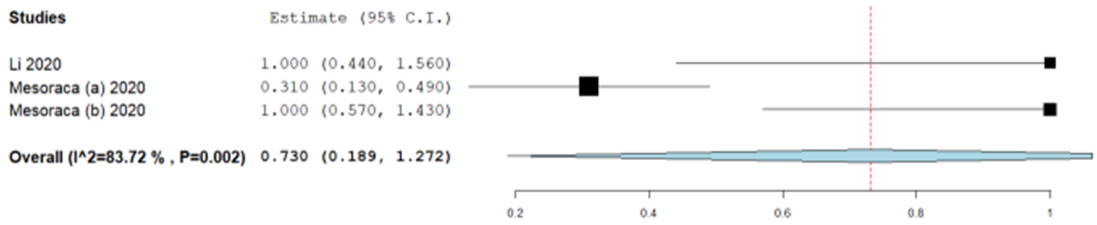
Supplementary S6. Subgroup analysis on tears specificity.



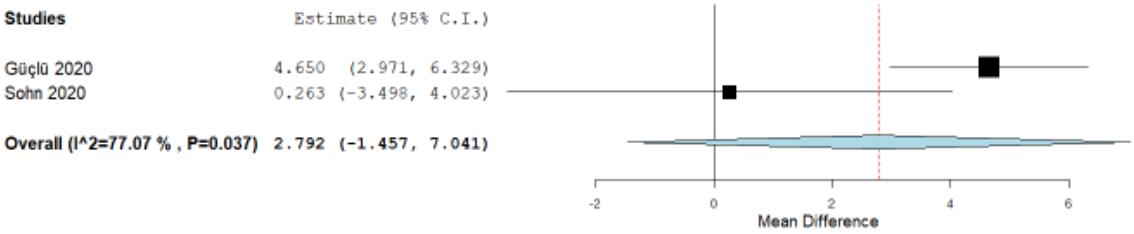
Supplementary S7. Subgroup analysis on feces sensitivity.



Supplementary S8. Subgroup analysis on feces specificity.



Supplementary S9. Forest plots of mean difference to reference sample (NPS) of CT for Saliva. Positive values mean increased RT-PCR cycle (and vice-versa) needed for reliable outcome in reference to NPS.



Supplementary S10. Forest plots of mean difference to reference sample (NPS) of CT for DTS/POS. Negative values mean decreased RT-PCR cycle (and vice-versa) needed for reliable outcome in reference to NPS.