

## Oral Rinse, Nasal Irrigation, and Risk Factor of COVID-19 Screening

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### Abstract

Coronavirus disease in 2019 spreads continuously in community, workplace, and market. The majority of disease control and prevention are active case finding, isolate case, and find new patients.

This Retrospective Study aimed to study risk factors of Coronavirus 2019 Virus Screening, Akat Amnuai Hospital, Sakon Nakhon Province, Thailand. Data were collected by laboratory report in 696 samples from database of 43 files reports in August 2021. They were suspected coronavirus 2019, contacted with infected family members, or closed up patients. All data were analyzed by descriptive statistics, Odd Ratio (OR), and 95% confidence interval.

The research results revealed that the Antigen Test Kit (ATK) positive 32.8% and negative of 67.0%. The Reverse Transcription Polymerase Chain Reaction (RT-PCR) positive response of 41.3%, and negative response of 58.5%. Additionally, the ATK result, age, test objectives, nasal and oral rinse were risk factors for RT-PCR positive.

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### Introduction

A breathing disorder known as COVID-19, or coronavirus illness 2019, or SARS-CoV-2 has been outbreaks continue to rise around the world<sup>1,2</sup>. The symptomatic was fever, cough, and possibly pneumonia<sup>3</sup>. The first infected patient in Thailand was reported on the 31<sup>st</sup> January 2019<sup>4,5</sup>. The coronavirus disease outbreak of 2019 had begun affecting people all over the world. According to the covid-19 is infectious disease which can transmit through small aerosols<sup>6,7</sup>. The spread of covid-19 virus, including other viruses that cause respiratory infections. It enters the body through the "mouth, nose, eyes", where the virus sticks and divides in the cells of the mucosa. Respiratory tract the virus does not enter the skin or skin lesions and Incubation Period (IP) refers to the period from exposure to the onset of illness. The IP for

COVID-19 is 2-14 days, which is why contacts are quarantined from others for 14 days<sup>8,9</sup>. Thailand, where encouraging people to take responsibility for their own health is a top focus for the Ministry of Health<sup>10</sup>. Measures such as prohibition of entry to high-risk areas, closures, etc. Places at risk of disease transmission, reduction of large gatherings of people, social distancing, wearing a cloth mask or face mask, hand washing supervision travelling in or out of certain provinces, and refrain from teaching at all levels of educational institutions<sup>11,12,13</sup>. Conferences with an emphasis on how to protect yourself, wear face masks, wash hands with disinfectant and stay apart. To prevent transmission from one person to another, laboratory diagnostic tests. Molecular techniques remain the standard method for diagnosing corona infection<sup>11</sup>. Genetic material testing of coronavirus RT-PCR, There are restrictions because this can only be done in particular labs due to its high sensitivity and specificity<sup>14,15,16</sup>. It takes a long time in each examination cycle. Make it in a situation where there is an outbreak of the disease causes a large number of infected people<sup>10</sup>. At present, there is a widespread outbreak requiring rapid results of testing in order to isolate, quarantine and receive treatment immediately, to prevent the spread of germs. As

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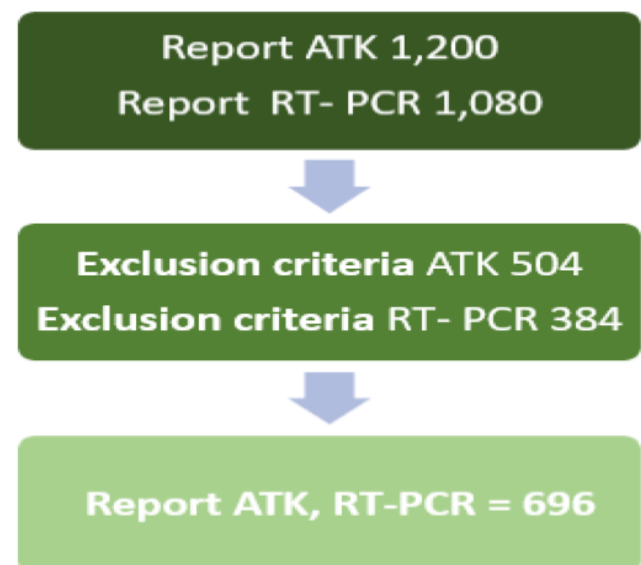
a national systemic test, sensitivity evaluation, and specificity for sars-CoV-2 infection diagnosis in England, fast antigen detection kits are employed. It is also used to swiftly diagnose the illness. Join the US as a whole in America, whether in a city or a rural location<sup>17</sup>. Health centers can reach high-risk populations to test for SARS-CoV-2 infection, which could potentially reduce COVID-19 transmission by identifying cases and supporting public health contact tracing and isolation between infected populations and non-infected people. This is an important component of using rapid testing in communities affected by COVID-19. It is now possible to get tested quickly and easily using a rapid antigen test kit (RAT) or an antigen test kit (ATK). It is feasible outside of a lab, despite the fact that RT-PCR testing is more sensitive and specific than antigen test kits (ATK)<sup>18,19</sup>.

World Health Organization has recommended that in areas with a prevalence greater than or equal to 5 percent, urgent COVID-19 test kits with sensitivity greater than or equal to 80 percent, and 97 percent more prevalence than RT-PCR can be used to identify new patients<sup>20</sup>. Disease investigations and monitoring of disease incidences in the community can be carried out. Mass testing uses rapid test kits to detect coronavirus antigens. SARS-CoV-2 is an objectively responsive approach for screening or surveillance to respond to a wide range of outbreaks, and to detect asymptomatic people with rapid results<sup>21,22</sup>. This increases the sensitivity to detect sars-CoV-2 antigens because of the rapid, fast, easy to read test results. No special equipment is used. For the outbreak situation of the air district, the directorate<sup>23,24,25</sup>. Sakon Nakhon province, the second outbreak, saw a large number of infections in the month of 2018 to 2021. Introduction data 2021 – 2022 patients were found 596 and 1751 cases respectively<sup>5</sup>. In order for initial screening to accelerate to isolate infected people, quarantine and bring them into treatment, proactive testing is required to find patients as quickly as possible, prevent, control and maintain rapid spread of infection in Outbreak zones<sup>11,26,27</sup>. In addition, nasal and oral douching with saline or antiseptic solutions has been observed in several studies to reduce illness duration by 1.9 days, reduce transmission to household contacts by 35% ( $p = 0.006$ ), and reduce viral shedding by 0.5 log10/ day ( $p =$

0.04)<sup>28</sup>. Therefore, a larger trial is required to confirm earlier findings. Hence, the present study aims at evaluating the level of the risk factors for covid-19 screening, and to study the sensitivity, specificity and accuracy of covid-19 screening kits.

## Materials and methods

This research was a retrospective study of 696 laboratory findings from The Medical Technical Group. Using ATK and RT-PCR results, which this secondary data obtained from a database of 43 files, the HosXp program at Akat Amnuay Hospital in Sakon Nakhon Province, Thailand, as shown in Figure 1.



**Figure 1.** The process of screening samples in the research.

## Data Collection

43 databases and laboratory findings served as the data source. Test results from the Sakon Nakhon province's Akat Amnuay Hospital using RT-PCR and ATK.

1. General data include gender, age, purpose of the test, nasal irrigation and oral rinse.
2. An indicator of the test.
3. Summarizing the results of the ATK and RT-PCR tests for SARS-CoV-2 infection, qualified medical technologists and public health researchers were required to obtain samples from the posterior part of the nasopharynx for ATK testing and RT-PCR.

The causes of SARS-CoV-2 infection utilizing a nasal swab, COVID-19 Antigen self-

test kits, and ATK detection test kits. It can be treated with SARS-CoV-2 antigen generated from semen. Nasal or oropharyngeal SARS-CoV-2 quality<sup>24</sup>. Swabs were used as the test sample; the nasopharyngeal sign was rotated at least ten times, the findings were then read, and the sample hole was filled with 4 drops. The cartridge is checked after pouring the sample for 10 to 15 minutes. Read the results in no more than 20 minutes. A positive result indicates the presence of both the C (Control line) and T (Test line) bands as well as the sars-CoV-2 viral antigens. There is no SARS-CoV-2 viral antigen present in the sample if only one C (Control line) develops<sup>25</sup>.



**Figure 2.** analysis for SARS-CoV-2 infection screening for COVID-19. Source, Adapted from the Ministry of Public Health, and Department of Disease Control<sup>10,11</sup>.



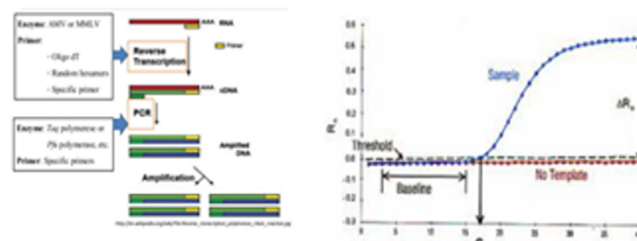
**Figure 3.** The interpretation of sars-CoV-2 (COVID-19 pathogen) antigen screening test  
Source: Adapted from the Ministry of Public Health, and Department of Disease Control<sup>10,11</sup>

RT-PCR method was widely recommended by the WHO for laboratories because it provides highly sensitive, and specific test results. The result was known within 2-3 hours. Use techniques to detect the genetic material of SARS-CoV-2. The test procedure was that a set of antibodies of the virus. RNA was then synthesized into cDNA, with reverse transcriptase enzymes being used to increase the amount of DNA required to be examined with

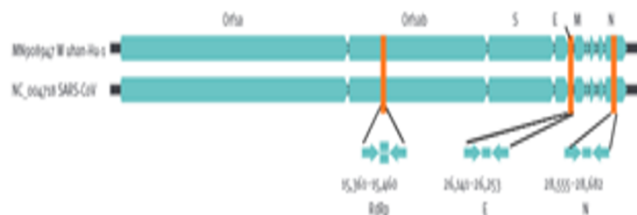
polymerase tag enzymes, primers and probes specific to SARS-CoV-2, as well as fluorescent color labeling using real time PCR tools. Excitation filter and analysis software by calculating, and analyzing the intensity of fluorescent light. It was expressed as a graph or light intensity figure in each cycle of the reaction. The result can be read in quantity virus found/not found<sup>27</sup>.



**Figure 4.** SARS-CoV-2 pathogen screening test results for self-detection of antigens  
Source: Adapted from the Ministry of Public Health, and Department of Disease Control<sup>10,11</sup>



**Figure 5** The principles of SARS-CoV-2 genetic material detection with RT-PCR technique  
Source: Adapted from the Ministry of Public Health, and Department of Disease Control<sup>10,11</sup>



**Figure 6.** The principles of SARS-CoV-2 genetic material detection with RT-PCR technique  
Source: Adapted from the Ministry of Public Health, and Department of Disease Control<sup>10,11</sup>

Most detections include primers and probes specific to the SARS-CoV-2 gene at different locations ranging from 1 to 3, such as ORF- 1a, ORF-1b and ORF-1 ab encode non-structural protein (nsp), and the encoded structural protein segments include S (spike), E (envelope), M (membrane) and N (nucleocapsid). The sample that detects the target gene must have an S-shaped graph. In conjunction with the consideration of the cycle threshold (Ct), the Ct value must be within the appropriate threshold as specified. RdRp and N genes, if Ct values are less than or equal to 42, report positive (detected), and RNase P genes, if Ct values are less than or equal to 40, report positive results if no fluorescence is detected, or Ct values do not meet the criteria, will report negative results (not detected)<sup>26,27</sup>. The interpretation is based on the Ct value, which is a real-time PCR genetic material increase loop that shows fluorescent signals intersecting with the threshold line. If the Ct value of the sample is lower than the Ct cut-off value, it indicates that the RNA of the target gene is found in that sample, but if it is higher than the Ct cut-off value, the sample does not have the RNA of the target gene, or that there is a lower dose than the limit of detection of that drug set<sup>28</sup>.

Data were analyzed general data by Frequency, Percentage, Mean, Standard deviation, Minimum and Maximum.

In addition, data were analyzed risk factors for covid-19 screening by odds ratio (OR) statistics and 95% confidence interval.

This study was approved by the Kasetsart University Research Ethics Committee (KUREC-CSC65/032). Written informed consents were obtained from participants who decided to join the study. Participants' names were deleted from the data-based files to protect the participant's privacy and confidentiality. Refusing to participate in the study would not have any effects on participants and services receiving from the public health centers. Data were collected by laboratory report in 696 samples from database of 43 files reports in August 2021. They were suspected coronavirus 2019, contacted with infected family members, or closed up patients.

## Results

A total of 696 participants were female 50.6 %, an average age of 33 years (SD. = 16),

patients in the age ranged from 0-60 years, 93.7 %, PUI screening objectives of 55.2 %, tested positive for ATK. 32.6 %. The results of ATK. were positive 32.8%, negative 67.0 %, and RT-PCR were positive 41.3 %, negative 58.5%. The risk factors for ATK. result were gender, age, purpose of the test, nasal irrigation and oral rinse with statistically significant ( $P < 0.0001$ ) as shown in Table 1.

Factors	ATK. test		OR	95%CI (Lower-upper)	(P-value)
	Negative (%)	Positive (%)			
1. Gender					
- Male	244 (70.4)	160 (29.1)	1.394	1.014-1.917	0.04*
- Female	224 (63.6)	128 (36.4)			
2. Age					
- 0 - 60 year	432 (66.3)	220 (33.7)	0.033	0.199-0.955	0.436
- > 60 year	36 (81.8)	8 (18.2)			
3. Purpose of examination					
- Patients Under Investigation (PUI)	184 (47.9)	200 (52.1)	0.091	0.059-0.140	0.001*
- Other screenings	284 (91.0)	28 (9.0)			
4. Nasal irrigation, oral rinse					
- No	387 (57.9)	284 (42.1)	2.52	1.020-4.423	0.001*
- Yes	19 (79.2)	6 (20.8)			

Table 1. Factors correlated with test results ATK. Test. \* Significant at level .05.

Factors	RT-PCR test		OR	95%CI (Lower-upper)	(P-value)
	Negative (%)	Positive (%)			
1. ATK					
- Negative	403 (86.3)	65 (13.7)	280.84	111.395-708.032	0.0001**
- Positive	5 (2.2)	223 (97.8)			
2. Age					
- 0 - 60 year	373 (57.0)	281 (43.0)	0.295	0.135-0.645	0.0001**
- > 60 year	36 (81.8)	8 (18.2)			
3. Purpose of examination					
- PUI Screening	141 (36.5)	245 (63.5)	0.094	0.065-0.138	0.0001**
- Other screening	268 (85.9)	44 (14.1)			
4. Nasal irrigation, oral rinse					
- No	142 (30.5)	324 (69.5)	3.61	1.330-6.979	0.003*
- Yes	216 (93.9)	14 (6.1)			

Table 2. Factors correlated with test results RT-PCR test. \*significant at level .05. \*\*significant at level .01.

The RT-PCR. results were positive 41.3%, and negative 58.5 %. Risk factors for RT – PCR results were ATK. results, age, test objectives, nasal irrigation and oral rinse. The positive ATK result was risk factors to 280 times the RT-PCR result ( $P < 0.0001$ ), 60 years old and over prevented COVID-19 from RT-PCR result 0.29 times more than under 60 years old ( $P < 0.0001$ ), other screening prevented COVID-19



from RT-PCR result 0.09 times more than the PUI screening group ( $P < 0.0001$ ), and the non-nasal irrigation, non-oral rinse were risk factors to 3 times the RT-PCR result ( $P = 0.003$ ), as shown in Table 2.

Sensitivity, specificity, Positive predictive value (PPV), Negative predictive value (NPV) ATK.

The diagnostic capability of the rapid, antigen-detecting test was demonstrated with sensitivity, specificity, and predictive value, including PPV and NPV. The sample size calculations estimated that 696 cases would be tested using an antigen-detecting test kit (ATK). They discovered that the capacity to distinguish between patients with sensitivity of 81.5 %, specificity of 98.6 % (PPV of 98.2 %, and NPV of 84.6 %), as shown in Table 3, 4.

ATK result	Positive	Negative
Positive	288 (98.2)	5 (1.7)
Negative	65 (15.4)	358 (84.6)

**Table 3.** ATK result of the samples. ( n= 696 )

Diagnostic performance	Value (N=696)
Cases	(prevalence)
Sensitivity (%)	81.5 %
Specificity (%)	98.6 %
Positive predictive value (%)	98.2 %
Negative predictive value (%)	84.6 %

**Table 4.** Diagnostic of rapid, antigen-detecting test for screening of symptomatic patients with suspected SARS-CoV-2 infection, using RT-PCR test as the reference ( n= 696 )

## Discussion

According to this study, the risk factors for SARS-CoV-2 infection screening with rapid antigen test kits and standard methods of testing. RT-PCR, ATK test kits provide sensitive test results 81.5 % and 98.2 % accuracy. In SARS-CoV-2 infection tests, ATK results were 280 times higher than risk factor compared to RT-PCR results. Because of the widespread use of ATK screening kits during the pandemic, the need for rapid antigen test kits to screen for SARS-CoV-2 infectins during this period is necessary in the community<sup>29</sup>. Fast-paced treatment, quarantine It also reduces the waiting time for RT -PCR tests that take 3-5 days to report results, requires special equipment, limits

the number of cases submitted, and the findings are consistent with the study<sup>30</sup>.

The employing various clinical samples, we quickly assessed the accuracy and effectiveness of sars-CoV-2 antigen detection kits and compared the findings. For RT-PCR and ATK. tests, samples from the nose and nasal cavity were taken from patients, and samples from the nasal cavity are taken for separate ATK tests. Comparing nasal and cheek samples to RT-PCR clinical samples used for SARSCoV-2 fast diagnosis, nasal and cheek samples demonstrated higher sensitivity (98.0%) and specificity (100.0%) than those samples. It found consistency with studies evaluating the clinical efficacy of new rapid detection devices. In patients with SARS-CoV-2 symptoms (n = 380), overall sensitivity and specificity were 91.0% (95% CI:84.8–95.3%) and 99.2% (95% CI: 97.1–99.9) compared to RT-PCR results<sup>31</sup>.

This kit has the ability to detect patients even after 6 days of onset of symptoms<sup>32</sup>. SARS-CoV-2 by RT-PCR test, of which 85 percent (n 1/4 261) can be detected using ATK. Regardless of age, gender, and type of strain, SARS-CoV-2 found the majority of RT-PCR positive patients, 94.0 %of whom were consistent with the study comparing ATK. test results. Clinical characteristics of positive RT-PCR patients and potential risks associated with antisemitism. 76.6% (95% confidence interval [CI], 71%–82%), and 99.7% specificity (95% CI, 99%–100%) showed no difference in efficacy between asymptomatic and asymptomatic individuals. Both are consistent with the study<sup>33</sup>.

Evaluation studies to rapidly test SARS-CoV-2 antigens for sars-CoV-2 diagnosis, while RT-PCR assays were a reference method for diagnosing the SARS-CoV-2 disease, however, this is time-consuming and laboratory. Techniques limiting the availability of tests rapid antigen detection tests are faster, popularly use test kits as screening tests to isolate patients and receive immediate treatment to prevent the spread of SARS-CoV-2. It was convenient and fast. This was consistent with the use of rapid for SARS-CoV-2 antigen tests to investigate the presence of SARS-CoV-2 antigens in samples. The overall sensitivity of the rapid for Antigen Rapid Test Kit was 80.3 percent. It had a specificity of 87.8 percent. Screening patients with asymptomatic symptoms and contacts was used to isolate measures at an early stage. It had

advantages over RT-PCR in that. It was easy to use and can be used in all laboratories and care points. There was also consistency with conducting the study. Accurate and fast testing Diagnostic capabilities are critical to disease control, rapid antigen testing. It yielded 95% sensitivity (95% confidence interval [CI] 88.7–98.4%), with 97% specificity (95% CI 91.5–99.4%)<sup>34,35,36</sup>.

This finding showed that non-nasal irrigation, non-oral rinse were greater risk factor than nasal irrigation, oral rinse. It was known that an oral rinse with antimicrobial agents is efficacious in reducing the viral load in oral fluids. Moreover, offered an indirect evidence of this aspect with the reduction of coronavirus shedding in the nasal swabs. Saline nasal irrigations (SNIs) had been shown in several studies to lower the viral load in the nasal canals. The viral load in oral fluids could be effectively decreased by using an oral rinse with antimicrobial drugs. The preventing and controlling spread of any respiratory infectious disease, including COVID-19, which supported the addition of SNIs and ethanol oral rinses to the existing public health measures<sup>37,38</sup>. This research should broadly extend knowledge to early childhood centres, schools, communities, as well as other research on COVID-19<sup>39</sup>.

## Conclusions

In conclusion, the ATK could validate RT-PCR results. Because screening was convenient, reduces costs, and allows for early Coronavirus 2019 identification. The ATK was adequate to validate its effectiveness, and non-nasal irrigation, non-oral rinse were greater risk factor than nasal irrigation, oral rinse. Viral antigens were found using ATK. test kits during preliminary screening. SARS-CoV-2 in laboratories is a common way to diagnose SARS-CoV-2. For the early detection of patients suspected of having COVID-19, especially in remote and densely populated areas, the use of ATK kits is often advised. As a result, this study looks at how well ATK can produce results that mirror RT-PCR assays. As a result, ATK is sufficient to aid in patient screening during outbreaks. It is practical, saves money, and allows for the early detection of SARS-CoV-2 in order to contain the disease, isolate the patient, place them in a quarantine, and admit them to the Akat Amnuai Hospital.

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## Declaration of Interest

The authors report no conflict of interest.

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