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RESEARCH ARTICLE

Knowledge of Rdt and Rt-Pcr for Covid-19 Detection among Medical Laboratory Technician and Medical Laboratory Technologist

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Abstract

Objective: Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus, named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). WHO declared COVID-19 as pandemic On March 11. **Methods:** RDT dan RT PCR was used for SARS-CoV-2 detection. Medical laboratory technicians and medical laboratory technologists play a vital role to provide the clinical support for the diagnosis of Covid-19. They must have good knowledge of the diagnosis methods to avoid the inaccurate or missed results. This study investigated the level of knowledge of them RDT and RT-PCR. The research design used was descriptive with a cross-sectional approach used questionnaire, with a sample of 102 people. **Result:** Statistical analysis that is used in descriptive is a way of analysis. The results showed that respondents had adequate level of knowledge about 77.5%, the respondents had poor knowledge of RDT 12.7%. As many as 9.8%, respondents had good knowledge of RDT. The respondents had adequate level of knowledge about RT-PCR 39.2%, the respondents had poor knowledge of RT-PCR about 57.8%. As many as 2.9% of participants had good knowledge of RT-PCR. **Conclution:** The researchers concluded that most of the respondents were well knowledgeable about RDT and were less knowledgeable about RT-PCR for COVID-19 detection.

Keywords: COVID-19- SARS-CoV-2- Medical- Technician- Technologist

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Introduction

The novel virus that causes pneumonia emerged in Wuhan City, Hubei Province, Central China in Late December 2019. It was temporally named 2019 novel coronavirus, 2019-nCoV. International Committee on Taxonomy of Viruses termed it SARS-Cov-2, due to the similarity of its symptoms to those induced by the Severe Acute Respiratory Syndrome (SARS) [1]. The SARS-CoV-2 is a betacoronavirus similar to SARS-CoV and MERS-CoV. The data of sequencing show that the SARS-CoV-2 is most closely related to coronaviruses found in bats. The virus has a 79% nucleotide identity to SARS-CoV and about 50% to MERS-CoV [2, 3]. On February 11, World Health Organization (WHO) announced that the disease caused by this new virus as a "COVID-19", which is the acronym of "Coronavirus disease 2019" and declared this disease as pandemic On March 11. To date, COVID-19 has spread rapidly in 216 countries [4].

SARS-CoV-2 is the seventh member of the family of CoVs that infect humans. This virus is a single-stranded, positive-sense RNA virus, having a diameter of 60-140 nm with a round or elliptic shape [3]. SARS-CoV has four structural proteins, spike (S) surface glycoprotein, the membrane (M) protein, the envelope (E) protein, and the nucleocapsid (N) protein, which is essential for SARS-CoV-2 assembly and infection [5]. The SARS-CoV-2 can be transmitted between humans via respiratory droplets. SARS-CoV-2 can be transmitted through direct or indirect contact with mucous membranes in the eyes, mouth ,or nose [6]. The mean incubation

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period of SARS-CoV-2 is estimated to be 3-7 days (range, 2-14 days) [7, 8]. The main manifestations of COVID-19 are fatigue, fever, dry cough, myalgia and dyspnoea, with less common symptoms being nasal congestion, headache, runny nose, sore throat, vomiting, and diarrhea. Severe patients often have dyspnoea and/or hypoxemia 1 week after onset, after which septic shock, ARDS, difficult-to-correct metabolic acidosis, and coagulation dysfunction develop rapidly. Of note, severe and critical patients can also only present with a low fever, or even no obvious fever, and mild patients show only low fever, mild fatigue, and no pneumonia. These asymptomatic or mild cases can also spread SARS-CoV-2 between humans [9, 10].

Rapid and accurate detection of SARS-CoV-2 is essential to control the outbreak of Covid-19. In Indonesia, Rapid Diagnostic Test (RDT) and Reverse Transcription Polymerase Chain Reaction (RT-PCR) used to detection of SARS-CoV-2. A Common type of RDT marketed for COVID-19; a test that detects the presence of antibodies in the blood of people believed to have been infected with COVID-19. Antibodies are produced over days to weeks after infection with the virus. The strength of antibody response depends on several factors, including age, nutritional status, the severity of the disease, and certain medications or infections like HIV that suppress the immune system [11-13]. RT-PCR assay was the standard and recommended methods for detecting. SARS-CoV-2 RT-PCR is a molecular biological diagnosis technology based on nucleic acid sequences. The complete SARS-CoV2 genome sequences are available in GenBank. Thus, the nucleic acid of SARS-CoV-2 can be detected by RT-qPCR or by viral gene sequencing of nasopharyngeal and oropharyngeal swabs, stool, sputum or blood samples [14-15].

During the COVID-19 pandemic, the world has turned its eye towards medical laboratory technicians and medical laboratory technologists. They play a vital role in provides the clinical support for the diagnosis of COVID-19. Inaccurate or missed results can lead to a missed diagnosis. Patients rely on clinicians to provide answers and manage healthcare concerns, and clinicians rely on medical laboratory technicians and medical laboratory technologists to provide accurate and reliable results to help make the best clinical decisions. That positive or negative result impacts patient response in our communities and the isolation protocols to minimize the spread of the virus. There are very strict rules and policies that must be followed in the lab to ensure the right result is reported out on the right patient. These tests are not just loaded on machines that do the work. They must also be the gatekeeper for the quality of all laboratory testing. They must completely understand every specimen collection and transport requirement, principle ,and the procedure of the test.

The objective of this research to investigate the level of knowledge of RTD and RT-PCT for COVID-19 detection among medical laboratory technicians and medical laboratory technologists. The result of this research can be used to performance improvement of medical laboratory technicians and medical laboratory technologists and health policymaking,

Materials and Methods

The research was carried out at Binawan University, Jakarta, Indonesia, from April to Mei 2020. This study design used was descriptive with a cross-sectional approach, with a sample of 102 people. Independent variables included gender, education, workplace, and work duration, while the dependent variable was the level of knowledge of RDT and RT-PCR.

Data were obtained using a self-administered questionnaire. The questionnaire included 12 items assessing the level of respondents's knowledge of RDT and RT-PCR, including its sample (items 1 and 2), principle (items 3-7), and time (item 8). The questionnaire was found to be valid and reliable with a Cronbach's alpha of 0.705. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25 IBM, and demographic data and level of knowledge of RDT and RT-PCR are presented using descriptive statistics.

Results

A total of 102 medical laboratory technicians and medical laboratory technologists from various hospitals and clinics participated in this study. The majority of the respondents were female 71.6% and male 28.4% with

Table 1. Characteristics of Respondents

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	29	28.4	28.4	28.4
Female	73	71.6	71.6	100
Total	102	100	100	
Work Duration	Frequency	Percent	Valid Percent	Cumulative Percent
< 1 Year	9	8.8	8.8	8.8
1 -5 Years	52	51	51	59.8
6 - 10 Years	19	18.6	18.6	78.4
11 - 15 Years	5	4.9	4.9	83.3
16 - 20 Years	11	10.8	10.8	94.1
> 20 Years	6	5.9	5.9	100
Total	102	100	100	

Table 2. Education of Respondents

Education	Frequency	Percent	Valid Percent	Cumulative Percent
SMK Health Analyst	59	57.8	57.8	57.8
Diploma-III Health Analyst	30	29.4	29.4	87.3
Diploma-IV Medical Laboratory Technology	8	7.8	7.8	96.1
Others	5	4.9	4.9	

Table 3. The Level Frequency of Testing

Level frequency of RDT Testing	Frequency	Percent	Valid Percent	Cumulative Percent
Never	10	9.8	9.8	9.8
Once	47	46.1	46.1	55.9
Rarely	3	2.9	2.9	58.8
Often	42	41.2	41.2	100
Total	102	100	100	
Level frequency of RT-PCR Testing	Frequency	Percent	Valid Percent	Cumulative Percent
Never	87	85.3	85.3	85.3
Once	12	11.8	11.8	97.1
Rarely	3	2.9	2.9	100
Often	0	0	0	
Total	102	100	100	

various work duration in hospitals or other public health agencies (Table 1). Table 2 shows that respondents have various education, more than half were SMK Analis Kesehatan about 57.8%, Diploma-III Analis Kesehatan 29.4%, Diploma-IV Teknologi Laboratorium Medis 7.8%, and Others 4.9%.

Table 3 show the level of frequency that respondents do of RDT and RT-PCR.

Table 4 shows the respondents' knowledge level about RDT for COVID-19 detection. The results showed that respondents had adequate level of knowledge about 77.5%, the participants had poor knowledge of RDT 12.7%. As many as 9.8%, participants had good knowledge of RDT.

Table 5 shows the respondents's knowledge level about RT-PCR for COVID-19 detection. The respondents had adequate level of knowledge about RT-PCR 39.2%, the participants had poor knowledge of RT-PCR about 57.8%. As many as 2.9% participants had good knowledge of RT-PCR.

Discussion

The respondents of this study were medical laboratory technicians and medical laboratory technologists as many as 102 people from hospitals and clinics around Indonesia (Jakarta, Depok, Bekasi, Tanggerang, Jawa Barat, Jawa Timur, Jawa Tengah, Cilegon, Palembang). According to Peraturan Menteri Kesehatan Republik Indonesia (Permenkes RI) No 24 Tahun 2015, Medical laboratory technologist is everyone who has graduated from a medical laboratory technology education or health analyst or medical analyst (Diploma-III and Diploma-IV) and has the competence to conduct analyze body fluids and tissues to get information about the health of individuals and the community. Medical laboratory technologists must have Registration letter to conduct their job [16]. Everyone who not graduated from a medical laboratory

Table 4. Level Knowledge of RDT

Level Knowledge	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	13	12.7	12.7	12.7
Adequate	79	77.5	77.5	90.2
Good	10	9.8	9.8	100
Total	102	100	100	

Table 5. Level Knowledge of RT-PCR

Level Knowledge	Frequency	Percent	Valid Percent	Cumulative Percent
Poor	59	57.8	57.8	57.8
Adequate	40	39.2	39.2	97.1
Good	3	2.9	2.9	100
Total	102	100	100	

technology education or health analyst or medical analyst (Diploma-III and Diploma-IV) and has the competence to analyze body fluids and tissues cannot be called Medical laboratory technologist so in this study we called them as "Medical laboratory technicians" who assist and support medical laboratory technologist.

Medical laboratory technicians and medical laboratory technologists play a vital role in provides the clinical support for the diagnosis of COVID-19. In Indonesia, the large hurdle to help our patients is the lack of COVID-19 tests and pre-analytical (extraction reagents, etc.) supplies. But the biggest hurdle of all is the lack of medical laboratory professionals who conduct those tests. They must completely understand every specimen collection and transport requirement, principle and the procedure of the test to provide accurate diagnosis results.

Table 4 and 5 show that majority of the medical laboratory technicians and medical laboratory technologists had an adequate level of knowledge about RDT (77.5%) for COVID-19. But the majority of the respondents surveyed had poor knowledge of RT-PCR (57.8%). The poor knowledge of RT-PCR determined in this research may be attributed to the fact that RT-PCR has rarely used as a detection method for infectious diseases in hospitals and clinics and even 85.3% of respondents have never done RT-PCR testing. This result may be also affected by the education of respondents. More than half of respondents is medical laboratory technicians who not graduated from a medical laboratory technology education or health analyst or medical analyst (Diploma-III and Diploma-IV). They may not study molecular diagnostics. The Medical curriculum is important to provide medical students with the knowledge, skills ,and attitudes required for their practice [17]. Medical technicians and medical laboratory technologists should be encouraged to gain information on RT-PCR and prepare themselves with the knowledge that can help them provide the clinical support for the diagnosis of COVID-19. Due to the critical nature of what they do, labs are highly regulated and require medical technologists and technicians to obtain education qualifications, certifications ,and continued training.

The viral pandemic, COVID-19 /SARS-CoV-2, has had a widespread impact on all aspects of daily life. The laboratory has to prepare against it. The result of this study shows that Hospitals and Public Health Agencies in Indonesia not well prepared against COVID-19 pandemic. The researchers recommend of COVID-19 detection:

1. The researchers recommend that Laboratory leadership must ensure personnel are provided training on knowledge and skill of COVID-19 detection methods and documented policies and procedures are read and, if possible, signed by all laboratory personnel

2. The researchers recommend that laboratories train staff from different clinical labs to perform each others' functions. This will allow for coverage if staff numbers become reduced, train as many staff as possible.

3. The researchers recommend that both manufacturers and laboratories are working to meet the clinical demands imposed by this pandemic like implement additional procedures and staff training.

In conclusion, medical laboratory analysts have adequate level of knowledge about RTD for COVID-19 detection and have poor knowledge regarding RT-PCR. Training recommended improving the current level of knowledge of RT-PCR.

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