JurnalEndurance :KajianIlmiahProblemaKesehatan
Avalilable Online http://ejournal.kopertis10.or.id/index.php/endurance

THE ROLE OF POLYMERASE CHAIN REACTION EXAMINATION IN EFFECTING DIAGNOSIS OF COVID-19 PATIENTS

Irmasari Ismail[1*], Azzaky[2]
[1)]Makassar Community Lung Health Center
*Correspondence email: iirmasari@gmail.com,
[2]KSM Dr. Soeradji Tirtonegoro Klaten
e-mail: azzaky_85@ymail.com

ABSTRACT
Coronavirus Disease 2019 (COVID-19) is a contagious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2). Severe cases of COVID-19 can lead to pneumonia, acute respiratory syndrome, kidney failure and death. The first case was reported in Wuhan City, Hubei Province, China, on March 11, 2020, WHO declared COVID-19 as pandemic. WHO recommends RT-PCR examinations for all patients suspected were infected with COVID-19 and becomes the gold standard for COVID-19 diagnostic tests in Indonesia. To get an overview of the role of PCR examinations in diagnosing COVID-19 patients in South Sulawesi. This research is a descriptive study by taking data on PCR COVID-19 results from laboratory networks in South Sulawesi from May - July 2020. During May - July 2020, the total number of PCR examinations from the seven network laboratories in South Sulawesi was 143,518. in BBLK, there were 59591 samples, then Wahidin Sudirohusodo Hospital 14140 and Microbiology Laboratory of Unhas Hospital 20734l. The postponement of PCR examinations occurred in June and July. In June, BBLK Makassar reported 1698 investigations, BBVET Maros 175, BPOM Makassar 161. In July, BTKL Makassar reported 309 PCR examinations and 112 Soppeng Healthcare Lab. PCR examination is the gold standard for diagnosing COVID-19.

Keywords

COVID-19; PCR; gold standard

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is a contagious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2). SARS-Cov-2 is a new type of coronavirus that has never been previously identified in humans. [1]The common signs and symptoms of COVID-19 infection include symptoms of acute respiratory disorders such as fever, cough and shortness of breath. The average incubation period is 5-6 days with the longest incubation period of 14 days. Severe cases of COVID-19 can cause pneumonia, acute respiratory syndrome, kidney failure and even death.[1]

On December 31st, 2019, the WHO (World Health Organization) of China reported a case of pneumonia of unknown etiology in Wuhan City, Hubei Province, China. On January 7th, 2020, China identified the case as a new type of coronavirus. On January 30th, 2020, WHO designated this incident as a Public Health Emergency of International Concern (PHEIC)[1,2] On March 11th, 2020, WHO declared COVID-19 a pandemic.[1-3]

The increase in the number of COVID-19 cases is progressing quite rapidly, and has spread to various countries in a short time. As of 9th July 2020, WHO reported 11,084,226 confirmed cases with 545,481 deaths worldwide (Case Fatality rate / CFR 4.6%). Indonesia reported its first case on March 2, 2020. Cases are increasing and spreading rapidly throughout Indonesia. As of 9th July 2020, the Ministry of Health reported 70,736 confirmed COVID-19 cases with 3,417 deaths (CFR 4.8%)[1]. Meanwhile, the number of COVID-19 cases in South Sulawesi as of 13th August 2020 was 10652 with 335 deaths. [4]

Coronavirus is a zoonotic (transmitted between animals and humans). The animal that is the source of transmission of COVID-19 is still unknown.[1.5]

Based on current epidemiological and virological studies, it is proven that COVID-19 is mainly transmitted from symptomatic people to other people who are in close proximity through droplets. Transmission can also occur through objects and surfaces contaminated with droplets around infected people.[1.5]

In order to break the chain of transmission, it is necessary to find cases as soon as possible through diagnosis which requires supporting examination, in this case a laboratory examination.

WHO recommends PCR examination for all patients suspected of being infected with COVID-19. PCR examination is an examination using the molecular detection method / NAAT (Nucleic Acid Amplification Test) such as the RT-PCR examination. Until now, PCR testing is still the gold standard for COVID-19 diagnostic tests in Indonesia

The aim of the study: to obtain an overview of the role of PCR examinations in diagnosing COVID-19 patients in South Sulawesi.

RESEARCH METHODS

This research is a descriptive study, by taking data from the PCR examination of COVID-19 from the PCR laboratory network in South Sulawesi. The research period starts from May 2020 to July 2020. The data obtained is then presented in tables and graphs.

RESULT AND DISCUSSION

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Since May - July 2020, 7 laboratories have been included in the COVID-19 laboratory network in South Sulawesi, namely:
1. The biomolecular laboratory of Wahidin Sudirohusodo Hospital
2. Microbiology Laboratory of Hasanuddin University Hospital
3. Central Health Laboratory
4. Environmental Health Engineering Center for Disease Control
5. Indonesian Food and Drug Research Institute
6. Laboratory of the Maros Regency Veterinary Center
7. Regional Health Laboratory of Soppeng Regency

Table 1. Number of PCR examinations in the Networking Laboratory of South Sulawesi

NO	LABORATORIUM	JUMLAH SAMPEL DIPERIKSA			TOTAL
		Mei	Juni	Juli	
1	BBLK MAKASSAR	9.747	19.222	30.622	59591
2	LAB RS WAHIDIN	2.990	11.150	20.947	14140
3	LAB UNHAS	3.642	7.554	9.538	20734
4	BBVET MAROS	176	1.285	3.214	4675
5	BPOM MAKASSAR	257	2.007	2.007	4271
6	BTKL MAKASSAR	857	2.804	6.385	10046
7	LABKESDA SOPPENG	1.361	2.997	4.756	9114
	TOTAL	**19.030**	**47.019**	**77.469**	**143518**

From table 1 above, it can be seen that the highest number of PCR examinations was in BBLK, namely 59591 samples, then Wahidin Sudirohusodo Hospital with 14140 samples, Microbiology Laboratory of Unhas Hospital with 20734 samples, Environmental Health Engineering Center with 10046 samples., Regional Health Laboratory of Soppeng Regency with 9114 samples . The average number of samples examined at BBLK was 1000 samples per day, while Wahidin Sudirohusodo Hospital and BTKL were 500 samples per day.

These seven laboratories are networked laboratories connected nationally through the Allrecord application of the Ministry of Health of the Republic of Indonesia.

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Table 2. Number of PCR delayed

NO	LABORATORIUM	BULAN			TOTAL
		MEI	JUNI	JULI	
1	BBLK MAKASSAR	546	1698	0	2244
2	LAB RS WAHIDIN	198	0	0	198
3	LAB UNHAS	5	0	0	5
4	BBVET MAROS	12	175	0	187
5	BPOM MAKASSAR	1	161	0	162
6	BTKL MAKASSAR	13	0	309	322
7	LABKESDA SOPPENG	97	194	112	403
	TOTAL	872	2228	421	3521

From table 2 above, it can be seen that there was a delayed PCR examination done by the network laboratory which occurred in June and July. BBLK Makassar reported 1698 pending PCR examinations, BBVET Maros reported 175 examinations, Makassar BPOM reported 161 examinations and Soppeng Labkesda reported 194 examinations. In July, the PCR examination postponed only occurred in two network laboratories, namely BTKL Makassar for 309 examinations and Labkesda Soppeng for 112 examinations.

Table 3. Distribution of PCR screening services

No	Laboratorium	Wilayah Kerja	Jumlah
1	BBLK MAKASSAR	Luwu utara, Luwu, Palopo, Toraja, Toraja utara, Pare-pare, Pinrang, RS di kota Makassar	8
2	LAB RS WAHIDIN	RS Wahidin, Bantaeng, Bulukumba, Enrekang, Luwu timur, RS di kota Makassar	6
3	LAB UNHAS	RS Unhas, RS di Kota Makassar	2
4	BBVET MAROS	Maros, Pangkep, Barru	3
5	BPOM MAKASSAR	Gowa, Jeneponto	2
6	BTKL MAKASSAR	Makassar, Selayar, Sinjai, Takalar, RS di kota Makassar	5
7	LABKESDA SOPPENG	Soppeng, Wajo, Sidrap, Bone	4
	TOTAL		30

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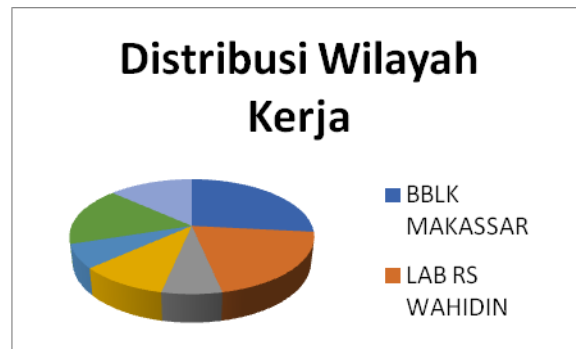
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Figure 1. Distribution of PCR inspection work areas

Table 3 shows that each laboratory has its own working area. There is a flow of work areas that have been determined by the South Sulawesi Provincial Health Office, for example BBLK serves PCR examinations from 8 districts or cities. The Wahidin Sudihusodo Hospital laboratory serves PCR examinations from 6 districts and cities and BTKL serves PCR examinations from 5 districts and cities.

In this study, the distribution of the work area determined by the South Sulawesi Provincial Health Office aims to anticipate the accumulation of samples in one laboratory which can lead to a longer examination time so that diagnosis and handling of COVID19 patients is delayed.

The diagnosis of COVID19 is confirmed by history, physical examination and supporting examinations.[6]Currently, WHO recommends molecular testing for all patients included in the suspect category. The method recommended for virus detection is nucleic acid amplification by reverse transcription polymerase chain reaction (RT-PCR).[5-8] The sample is said to be positive (confirm SARS-CoV-2) if the RT-PCR is positive for at least two genomic targets (N, E, S or RdRP) that are SARS-Cov-2 specific.[5.8] In contrast to WHO, the Center for Disease Control (CDC) currently only uses N and RP primers for molecular diagnosis.[5.7] A sample test that can be used is from a sample in the form of a throat swab. Nasopharyngeal swabs are good for evaluation of influenza but for other coronaviruses nasopharyngeal swabs are taken using a swab of dacron or rayon instead of cotton. [6.9]

The first identification of COVID-19 is a pan corona examination, which includes HCoV-229E, HCoV-NL63, HCoV-HKU1 and HCoV-OC43, then a specific SARS-Cov-2 examination is carried out. [6,8,9]

Reexamination is necessary to determine the response to therapy as the clinical improvement proceeds. If clinical improvement is obtained and RT-PCR results are negative 2 times consecutively within 2-4 days the patient is declared cured.[6.10]

During May - July 2020, the total number of PCR examinations from the seven network laboratories in South Sulawesi was 143,518. This PCR examination includes not only examination for diagnosis but also re-examination for monitoring patients after undergoing treatment in the hospital or after undergoing self-isolation for patients who have

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confirmed positive but do not show clinical symptoms of COVID-19.

For reporting the number of new cases and recovered cases of COVID-19 in South Sulawesi, using individual data including data on PCR results in the Allrecord application of the Ministry of Health of the Republic of Indonesia. The data on the number of new cases obtained is a reference for the local government to determine strategic steps to break the chain of transmission that still occurs in the community.

This study has limitations, namely the number of PCR examinations performed by each network laboratory does not separate the PCR examination results for the diagnosis group and the post-COVID-19 treatment monitoring group.

In this study, it was found that there was a delay in PCR examination. The delay occurred because each laboratory had almost the same problems. Delays in PCR examination results can occur due to:

1. Unavailability of reagents
2. Contamination of the sample
3. Contamination of the room
4. Human resources (HR) are exposed so they must be quarantined

Postponement of PCR examinations can result in delays in PCR examination results and if this occurs in certain cases that are waiting for the results of the PCR examination, for example the condition of a critical patient then dies, this is a problem because it is related to the funeral protocol. Currently, the United States Food and Drug Administration (FDA) has approved the use of a GenXpert® based molecular rapid test called Xpert® Xpress SARS-Cov-2. The molecular rapid test (TCM) is easier to perform and faster because the process is automated, which greatly helps speed up detection. These 5 TCMs are used in certain cases, for example: the patient dies and the PCR results are not available.

In this study, the distribution of work areas determined by the South Sulawesi Provincial Health Office aims to anticipate the accumulation of samples in one laboratory which can lead to a longer examination time so that diagnosis and handling of COVID-19 patients is delayed.

CONCLUSION

PCR examination is the gold standard for diagnosing COVID-19, Delays in PCR examinations are due to reagent factors, human resources and laboratory facilities.

THANK-YOU NOTE

To the South Sulawesi Provincial Health Office for assisting in providing data for the preparation of this research.

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