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Overview of COVID-19 Test Results (2021–2022) at the Laboratory of the Faculty of Medicine, Universitas Swadaya Gunung Jati, Cirebon, Indonesia

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ABSTRACT

Background: COVID-19 (Coronavirus Disease-19) is a respiratory infection caused by the SARS-CoV-2 virus. In 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic due to the rapid rise in cases and mortality rates worldwide. The pandemic has impacted millions of people and continues to pose a significant global public health threat. Accurate diagnosis of the disease depends on laboratory testing, with RT-PCR widely recognized as the gold standard for confirming COVID-19.
Aims: To describe an overview of COVID-19 test results at Laboratory Faculty of Medicine, Universitas Swadaya Gunung Jati, Cirebon, Indonesia, from 2021-2022.
Methods: This study used a descriptive observational method. The sample was collected in July 2024 using a total sampling technique. The sample includes all 135,713 patients who had COVID-19 tests at Laboratory Faculty of Medicine Swadaya Gunung Jati Univesity between 2021 and 2022. Data were collected from medical records of COVID-19 test. The variables of this study include gender, age, and COVID-19 test results. A statistical analysis was used to determine frequency distribution.
Results: The results of the study showed that among the sample who tested for COVID-19, the majority are male (50.9%) and early adolescent age group (23.9%). RT-PCR test findings were positive in 16.3% of patients and negative in 83.7% of patients. Among PCR positive cases, the majority are female (17.4%), with seniors age groups >65 years accounting for 39.0%.
Conclusion: Most of the tested samples are males and early adolescent age groups, with more negative PCR results than positive ones. Among positive cases, the highest number was found in females and seniors age group. It is recommended that females and seniors age groups keep protected during COVID-19 outbreaks.

Keywords: *COVID-19, SARS-Cov2, Laboratory test, PCR Test, Age, Gender.*
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1. Introduction

Coronavirus Disease 2019 (COVID-19) is caused by SARS-CoV-2 virus, which primarily affects the respiratory system and is highly contagious (Susilo 2021). The increase in the number of cases and mortality rates in many countries led the WHO to declare COVID-19 a global pandemic (Committee WHO2021).

The COVID-19 pandemic caused by the SARS-CoV-2 virus, poses a serious public health risk (Li et al. 2020). As of May 19, 2024, the WHO reported 775,522,404 COVID-19 cases worldwide (WHO 2024). According to the Indonesian Ministry of Health, by June 2023, there were 6,811,444 cases of COVID-19, with 161,853 deaths (Kemenkes RI 2023). In West Java, based on COVID-19 statistics, Cirebon City alone recorded a total of 16,481 confirmed positive cases between March 2020 and May 2024 (PIKOBAR 2023).

Gender and age are currently fundamental epidemiological factors for COVID-19 and can be used to assess patient prognosis. According to data from 137 countries, in January 2021, 50.9% of COVID-19 patients are male, while 49.1% are female (UN Women 2020). While some theories suggest that men are at higher risk than women, epidemiological data from various countries often show the contrary. In the other study, COVID-19 is more prevalent among women, accounting for 52.9% cases by (Fitriani, Putra, and Asyari 2022). Beside gender, age is also a significant factors affecting the level of exposure to the virus (Public Health England 2020).

The clinical signs of SARS-CoV-2 infection range from asymptomatic to severe illness. Early laboratory detection of SARS-CoV-2 is critical for effective pandemic treatment and management. According to (Patel et al. 2020), the standard method for detecting SARS-CoV-2 is the real-time reverse transcription quantitative polymerase chain reaction (RT-PCR), using samples from nasopharyngeal or oropharyngeal swabs, sputum, or bronchial lavage.

Laboratory testing plays a crucial role in managing COVID-19, including screening, diagnosis, monitoring therapy, prognosis assessment, and surveillance (Yusra and Pangestu 2020). The aims of this study is to describe an overview of COVID-19 test results at the Laboratory Faculty of Medicine, Universitas Swadaya Gunung Jati from 2021 to 2022. Age and gender are additional factors that influence COVID-19 infection rates. Based on this background, it is important to study and understand the results of COVID-19 tests at the Laboratory of the Faculty of Medicine, Universitas Swadaya Gunung Jati, because the laboratory is a one of the COVID-19 diagnosis centre in West Java, particularly in the Ciayumajakuning region, and it can be used to view the demographics of COVID-19 cases.

2. Methods

Study design/ Research procedures

This study used descriptive observational methods. Descriptive analysis was used in this study due tue large population. The data were collected in July 2024 from medical records at the Laboratory Faculty of Medicine, Universitas Swadaya Gunung Jati, which is the centre of COVID-19 tests in Ciayumajakuning region. The study population consists of patients who were tested for COVID-19 at the Laboratory of the Faculty of Medicine, Universitas Swadaya Gunung Jati from 2021 to 2022. A total sampling technique was used in this study. because it involves the entire population, making the analysis results more accurate and reflective of the actual conditions.

Measurements

The study examines variables such as gender, age, and PCR test results. The sample was collected using total sampling technique and included all patients who were tested for COVID-19 at the Research Laboratory of the Faculty of Medicine, Universitas Swadaya Gunung Jati from 2021 to 2022, depending on the inclusion and exclusion criteria. The inclusion criteria were medical records data of COVID-19 tests from 2021-2022, including gender, age, and PCR test result. Incomplete medical record data were excluded from this study.

Statistical techniques

This study employed univariate analysis to examine the frequency distribution and percentage of each variable, such as age, gender, and RT-PCR test results. Gender include male and female. Age was classified into 9 groups: toddler, children, early adolescent, late adolescent, young adults, late adults, early elders, late elders, and seniors. RT-PCR test results were categorized as either positive or negative.

Ethical Clearance

Secondary data collection was conducted with permission from the Laboratory of the Faculty of Medicine at Universitas Swadaya Gunung Jati, Indonesia. The researcher did not include the subjects' identities when collecting data. This study has received ethical approval from the Ethic Committee STIKES Mahardika in July 2024 under the reference No. 099/KEPK.ITEKESMA/VI1/2024.

3. Results

In total, 135,713 samples met the inclusion criteria. The data collected included gender, age, and PCR test results. The data was analyzed using SPSS computer software. SPSS is a software application for statistical analysis. The results are presented in the following tables that use univariate analysis to describe the characteristics of the variables.

Table 1. Frequency Distribution of All Patients who tested for COVID-19

Variables	n	%
Sex		
Male	69,046	50.9%
Female	66,667	49.1%
Age		
Toddler (<5 years)	1566	1.2%
Children (5-11 years)	11,969	8.8%
Early Adolescents (12-16 years)	32,425	23.9%
Late Adolescents (17-25 years)	22,412	16.5%
Young Adults (26-35 years)	21,858	16.1%
Late Adults (36-45 years)	18,705	13.8%
Early Elders (46-55 years)	14,660	10.8%
Late Elders (56-65 years)	9044	6.6%
Seniors (>65 years)	3074	2.3%
PCR Test Results		
Negative	113,529	83.7%
Positive	22,184	16.3%
Total	135,713	100%

According to the data presented in Table 1, more male than female tested for COVID-19, with 69,046 males (50.9%) and 66,667 females (49.1%). The largest age group was early adolescents, with 32,425 patients (23.9%). Out of the 135,741 tested patients, 22,184 (16.3%) tested positive for COVID-19 and 113,529 (83.7%) tested negative.

Table 2. Frequency Distribution of COVID-19 Laboratory Test Results by Gender

Gender	RT PXR Test Results				Total	
	Positive		Negative			
	n	%	n	%	n	%
Male	10,582	15.3%	58,464	84.7%	69,046	100%
Female	11,602	17.4%	55,065	82.6%	66,667	100%

Table 2 shows the distribution of COVID-19 laboratory test results by gender. Among females, 11,602 patients (17.4%) tested positive, while 55,065 (82.6%) tested negative. Among males, 10,582 patients (47.7%) tested positive, and 58,464 (84.7%) tested negative. It can be concluded that positive PCR test results are more common in females than in males.

Table 3.Frequency Distribution of COVID-19 Laboratory Test Results by Age

Age	RT PCR Test results				Total	
	Positive		Negative			
	n	%	n	%	n	%
Toddler (<5 years)	377	24.1%	1189	75.9%	1566	100%
Children (5-11 years)	634	5.3%	11,335	94.7%	11,969	100%
Early Adolescents (12-16 years)	1,014	3.1%	31,411	96.9%	32,425	100%
Late Adolescents (17-25 years)	2,967	13.2%	19,445	86.8%	22,412	100%
Young Adults (26-35 years)	5,733	26.2%	16,125	73.8%	21,858	100%
Late Adults (36-45 years)	4,502	24.1%	14,203	75.9%	18,705	100%
Early Elders (46-55 years)	3,428	23.4%	11,232	76.6%	14,660	100%
Late Elders (56-65 years)	2,329	25.8%	6,715	74.2%	9,044	100%
Seniors (>65 years)	1,200	39.0%	1,874	61.0%	3,074	100%

Table 3 summarizes the characteristics of patients with positive COVID-19 PCR test results, categorized by age groups. The largest group with positive results was seniors (>65 years) with 1,200 patients (39.0%), followed by young adults with 5,733 patients (26.2%), late elders with 2,329 patients (25.8%), late adults with 4,502 patients (24.1%), toddlers with 377 patients (24.1%), early elders with 3,428 patients (23.4%), late adolescents with 2967 patients (13.2%), children with 634 patients (5.3%), and the smallest group is adolescents with 1014 patients (3.1%).

4. Discussion

The study findings reveal that the majority of patients who were tested for COVID-19 are male, totaling 69,046 patients (50.9%). However, laboratory results indicated that a higher proportion of positive PCR results are found in females, with 11,602 patients (17.4%).

According to (Begley 2020), men spend more time outside the home compared to women. Other research supports this finding, as a study conducted by Afifah et al. (2021) explained that during the pandemic, men received more COVID-19 information from various media. Men were reported to be more active in seeking while women were often occupied with household responsibilities.

Laboratory results show that 52.3% of the positive PCR tests were among women. This aligns with earlier research, such as Dea et al. (2024), which found a higher prevalence of COVID-19 among women in Cirebon, at 56.70%. Similarly, Salsabilla and Anggara (2023) reported that 57,6% of COVID-19 patients are women. The study by Khaerunnisa et al. (2022) suggested that women might be more susceptible to stress when facing new challenges, which could influence these results.

The hypothalamic-pituitary-adrenal (HPA) axis plays a key role regulates the body's reaction to stress, mood, sexuality, digestion, and immunity. Prolonged stress can raise levels of glucocorticoids and catecholamines, which suppress pro-inflammatory cytokines and boost anti-inflammatory cytokines. This can reduce the body’s inflammatory response to pathogens, making it more vulnerable to disease (Caroline Dharmawan 2021). This is linked to factors such as women’s roles as caregivers, which can raise the risk of COVID-19 transmission if they care for infected family members (Kabeer, Razavi, and van der Meulen Rodgers 2021). Furthermore, most healthcare workers are women, notably those in high-risk jobs, this increases the likelihood of COVID-19 transmission among and to women (Doerre and Doblhammer, 2022).

According to this study, the largest group of patients tested for COVID-19 were in the early adolescence age group (12-16 years), with 3,425 patients (23.9%). However, the senior age group (>65 years) had the highest number of positive PCR results, with 1,200 patients (39.0%).

The findings suggest that early adolescents age group (12-16 years) were tested for COVID-19 more than any other group, with a total of 32,425 patients (23.9%). According to Masyah (2020), social restrictions during the COVID-19 pandemic heightened fear among teenagers due to the overwhelming amount of information they received about the pandemic. Excessive exposure to COVID-19 information might trigger anxiety, worry, and stress, and sometimes cause symptoms similar to COVID-19. This most likely contributed to increased testing rates among adolescents compared to other age groups.

The data also reveal that the majority of positive PCR tests were in the seniors age group (>65 years), with 1,200 patients (39.0%). This study is similar to (Martini and Mendrofa 2021), who discovered that the highest number of COVID-19 cases in Aminah Hospital Tangerang were among the seniors group, accounting for 52.1% of cases. The CDC (2023) reports that eight out of ten deaths from COVID-19 in the United States occur in individuals aged 65 and older. The World Health Organization likewise classifies those over 65 as a high-risk group for COVID-19 (WHO 2021).

The research suggest that immune system dysfunction in older adults makes them more susceptible to COVID-19 (Wasityastuti et al 2020). The virus enters the body through interactions between the S protein and ACE2 produced by epithelial cells, which are significantly influenced by the immune response (Young et al. 2020). The decrease in immune function with age leads to a higher risk of respiratory infections. Weakened mucosal barriers, less effective mucociliary clearance, and a weaker immune response and inflammation in the respiratory tract, all contribute to ineffective immune responses due to immunosenescence. Decreased cilia activity in the lungs leads to reduced mucociliary clearance, and lower levels of IgA in the nasal and lung mucosa correlate with a weakened immune response to the virus (Liu et al. 2020).

Eldelry has decreased tissue and organ function, making them more susceptible to diseases. Their organs and immune systems become less efficient, and they often have pre-existing conditions that make it harder to fight infections. Reduced lung tissue elasticity and inflammation in elderly can lead to significant complications, including organ damage (Okan et al. 2020). According to a study by Azwar et al (2020), the most common underlying chronic diseases were associated with increased risk for death of COVID-19 patients, including diabetes mellitus, cardiovascular disease, kidney disease, respiratory disease (including severe asthma), and history of malignancy. Older patients are more prone to experiencing severe health problems as a result of SARS-CoV-2 infection (Perrotta et al. 2020), and evaluation and treatment can be challenging. Therefore, it is recommended that older patients stay protected during COVID-19 outbreaks.

This is different with the situation for the children age group, which has a lower positive rate of 5.3%. In the first months of life, a baby is protected by antibodies from breast milk against microorganisms recognized by the mother's body. During childhood, the body produces the most IgM antibodies, and it protects them from infection. The relationship between COVID-19 and age is also influenced by factors such as lifestyle, comorbid conditions, psychological factors, education, employment, government policies, population, and access to and quality of healthcare services (Public Health England 2020).

5. Conclusion

The majority of COVID-19 tests were conducted on men (50.9%), with adolescents (23.9%) being the most commonly tested age group. The PCR test results showed more negatives (83.7%) than positives (16.3%). Among the positive results, the highest proportion was observed in females (17,4%) and the senior age group (39.0%). Based on this findings, it is recommended that the Health Office of West Java, particularly Ciayumajakuning region, strengthen health promotion activities and encourage the community to take an active role in preventing COVID-19 transmission. Females and the senior age group should be prioritized for protection during COVID-19 outbreaks.

Conflict of Interest

The authors state that there are no conflicts of interest concerning the results.

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