The Relationship between the Degrees of Clinical Manifestations and IgG Antibodies When a Confirmed COVID-19 Recovered Patient at the M. Yunus Hospital and The Harapan and Doa Hospital of Bengkulu City in 2020

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KEYWORDS

COVID-19, Clinical manifestations, IgG, Antibody, Recovered Patient

ABSTRACT

Background: COVID-19, or coronavirus disease, was declared a pandemic by the WHO in 2020. Coronavirus 2 (SARS-CoV-2) is the infectious agent responsible for this disease. The antibodies that the human body makes in reaction to a viral infection include IgM and IgG. The body will display different clinical indications according on how effectively it generates antibodies. Investigate the relationship between COVID-19 patients' clinical manifestations and their levels of IgG Anti-SARS-Cov-2 antibodies in Bengkulu City in 2020. The severity of clinical signs and symptoms during the sickness influences the level of antibody response generated. Methods: Descriptive research methodologies are utilized in this study, which is a retrospective. The sample strategy employed was consecutive sampling with non-probability sampling. The level of clinical manifestation of COVID-19 patients is established by the Indonesian Ministry of Health using its 2021 categorization. When looking for a connection between the two variables, the Pearson correlation test was used. Results: The research methods used in this study are descriptive and are structured like a retrospective. A non-probability sampling strategy based on the progressive sampling method was used to collect the samples. The Indonesian Ministry of Health will categorize COVID-19 patients in 2021 based on their clinical manifestation level. To look at the link between the two variables, we used the Pearson correlation test. Conclusion: Levels of IgG anti-SARS-Cov-2 antibodies and clinical symptoms in COVID-19 patients who have recovered in Bengkulu City are linked.

1. Introduction

Coronavirus sickness (COVID-19) is caused by the Severe Acute Respiratory Coronavirus Syndrome 2 (SARS-Cov-2). The Coronaviridae family counts this coronavirus among its members (Neelima et al., 2024). This virus has the largest RNA genome, spanning about 26-32 kilobases, located in its positive-strand RNA encasing material. The four primary types of coronaviruses are SARS-CoV, MERS-CoV, Gammacoronavirus, and Betacoronavirus respectively (Ji et al., 2021). Clinical signs in individuals with COVID-19 A cytokine storm, which results from the release of large amounts of supportive of inflammatory cytokines over this immune response, can cause lung damage. Radiographs of the chest showing signs of acute respiratory distress syndrome (ARDS) such as bilateral turbidity, effusion, lobar or collapsed lungs are diagnostic of a cytokine storm. Every patient with Acute Respiratory Distress Syndrome (ARDS) has a unique set of symptoms, which can range from completely asymptomatic to very mild, moderate, severe, and even critical. There was a discernible difference in IgG antibody levels between mild and severe cases of SARS-CoV-2 infection from the fifteenth day onwards, however some patients exhibited a robust IgG antibody response as early as the ninth day following the onset of symptoms. Severe COVID-19 cases often have a higher IgG response to SARS-CoV-2 than moderate instances, while some mild cases do not have an appropriate IgG antibody response (Amiruzzaman et al., 2022). Nine days following the onset of symptoms, some individuals with moderate illness exhibit a robust IgG antibody response (Liu et al., 2020). During the acute phase, the symptomatic group's IgG levels were much higher than the asymptomatic group's. But,

the IgG antibody response dropped sharply between weeks 5 and 7, and it was low even after week seven (Long et al., 2020). IgG levels will drop all through the healing phase a few months following infection. IgG antibody levels in symptomatic patients are much greater than in asymptomatic patients all through the early recovery phase, which lasts for eight weeks after hospital discharge. IgG antibody levels will drop in recovered patients in around 6-7 weeks, however the percentage of asymptomatic patients with decreasing IgG antibody levels is larger than that of symptomatic patients (Long et al., 2020).

2. Methodology

This study employed a descriptive research method utilizing a retrospective study form to determine differences in the severity of clinical manifestations in terms of anti-SARS-CoV-2 IgG antibody levels in COVID-19 patients who were confirmed to have been relieved at different hospitals in Bengkulu City in 2020 (Ahmad et al., 2024). Patients with COVID-19 will be categorized based on the severity of their symptoms using the standards set out by the Indonesian Ministry of Health starting in 2021. Based on these findings, we will also collect laboratory data of IgG Anti-SARS-Cov-2 antibody levels in COVID-19 patients at two facilities in Bengkulu City: the Harapan dan Doa Hospital and the M. Yunus Regional General Hospital. The medical record data consisted of personal data of research samples, initial assessment, disease course including laboratory results, X-ray results, and status when the patient leaves the hospital (Kutlu et al., 2022). Data analysis of two variables, the independent variable (clinical manifestation) and the dependent variable (IgG antibody level) in this study, will be distributed into a table to find a descriptive picture of the characteristic data. The normality test used in this study was the Shapiro-Wilk test. Data is deemed to have a normal distribution if the p-value is greater than 0.05. Data with a deviation significance from linearity > 0.05 indicates the presence of a linear connection, according to the linearity test using the Anova Table. This study's data analysis method will combine the Pearson correlation test with bivariate analysis.

3. Results and discussion

Information About COVID-19 Patients at the M. Yunus Hospital and the Harapan and Prayer Hospital in Bengkulu City (in 2020)

Patients with COVID-19 who visited M. Yunus Hospital, Harapan, or Prayer Hospital in Bengkulu City in 2020 were categorized according to their age, orientation, and clinical manifestation features in Table 1.

Table 1. displays the recurrence distribution of COVID-19 patient features at M. Yunus Hospital and Harapan dan Doa Hospital in Bengkulu City from September to October 2020, broken down by orientation, age, and clinical symptoms.

Characteristics of COVID-19 patients		**n(%)**
Gender	• Male • Female	68(58%) 49(42%)

Age	• 0-24 Years • 25-34 Years • 35-44 Years • 45-54 Years • 55-64 Years • > 65 years	10(9%) 20(17%) 29(25% 24(20%) 22(19%) 12(10)
Clinical symptoms	• Fever • Cough • Congested • Anosmia • Weak • Augesia • Loss of consciousness	68(58%) 73(62%) 56(47%) 39(33%) 40(34%) 11(9%) 21(117%)

The distribution of different COVID-19 patient characteristics at M. Yunus Hospital and Harapan dan Doa Hospital in Bengkulu City between September and October 2020 is shown in the table. There were 68 male patients, or 58% of the total, and 49 female patients, or 42% of the total, in terms of gender. This suggests that among the group under study, males had a higher prevalence of COVID-19. The patients' age distribution demonstrates a wide variety. Patients between the ages of 0 and 24 made up the smallest group 10 people, or 9% of the total. Of the patients, 20 were in the 25–34 age bracket, or 17%. With 29 patients, or 25% of the total, those between the ages of 35 and 44 made up the largest age group. Twenty percent of the total, or 24 patients, belonged to the 45–54 age group. Patients between the ages of 55 and 64 comprised 22 individuals, or 19% of the total, while patients above 65 accounted for 12 persons, or 10%. The distribution of COVID-19 patients indicates a notable representation of middle-aged and older persons. The patients presented with a wide range of clinical symptoms. Of the instances, 68 patients (or 58% of the total) had a fever, and 73 patients (62% of the total) had a cough. Congestion affected 56 patients, or 47% of the total. 39 individuals, or 33%, had anosmia, or the loss of smell. Thirty patients, or thirty percent, experienced weakness, while eleven patients, or nine percent, suffered augesia, or loss of taste. Notably, a loss of consciousness occurred in 21 patients, or 17%. This distribution of symptoms shows that among the patients, fever and cough were the most prevalent symptoms, with a considerable proportion also reporting congestion and weakness. A study on the demographics and medical histories of COVID-19 patients with co-infections and comorbidities was carried out in Bengkulu City in September and October 2020 at three hospitals: M. Yunus, Harapan, and Doa. Finding out how common different co-infections and comorbid illnesses were in these patients was the main goal of the study. According to the data, 35 patients (30%) had Type 2 Diabetes Mellitus, indicating that a sizable number of the patients had this illness. Another common finding was hypertension, which affected 27 individuals (23%). Heart problems, which affected 3 patients (2%) and 4 patients (3%), respectively, were less common than chronic kidney disease (CKD) and coronary heart disease. The number of co-infections was comparatively low. There was only one patient with HIV, one with bacterial pneumonia, and two with tuberculosis. The aforementioned results underscore the diverse medical obstacles encountered by COVID-19 patients in Bengkulu City, underscoring the significance of effectively managing comorbidities and co-infections in order to enhance patient outcomes.

Table 2. From September to October 2020, researchers in Bengkulu City examined the demographics and medical histories of COVID-19 patients with co-infections and comorbidities at three different hospitals: M. Yunus, Harapan, and Doa.

Characteristics of COVID-19 patients	**n(%)**

Comorbid	• Type 2 Diabetes Mellitus • Hypertension • CKD • Coronary heart	35(30%) 27(23%) 3(2%) 4(3%)
Co-infection	• HIV • Bacterial Pneumonia • tuberculosis	1 1 2

Table 3 displays the distribution of recurrence statistics on the age and orientation characteristics of the study subjects based on the research sample collected in September-October 2020.

Table 3 Distribution of Frequency Characteristics of Research Subjects

	Characteristic Data	Frequency		Total
		n	%	
Age	25-34 Years 35-44 Years 45-54 Years 55-64 Years	11 7 0 3	52% 33% 0% 14%	21
Gender	Male Female	7 14	33% 67%	21

Based on Table 3, the research data results showed that most of the research subjects were female, 14 people (72%), with the highest age distribution in the research subjects being in the age range of 25-34 years, 11 people (52%).

Examining the COVID-19 Patient Manifestation Levels at M. Yunus Hospital, Harapan Hospital, and Doa Hospital in Bengkulu City in 2020

Figure 1 below shows the frequency distribution of COVID-19 patient research participants according to the degree of clinical manifestations as reported by the Ministry of Health in 2022.

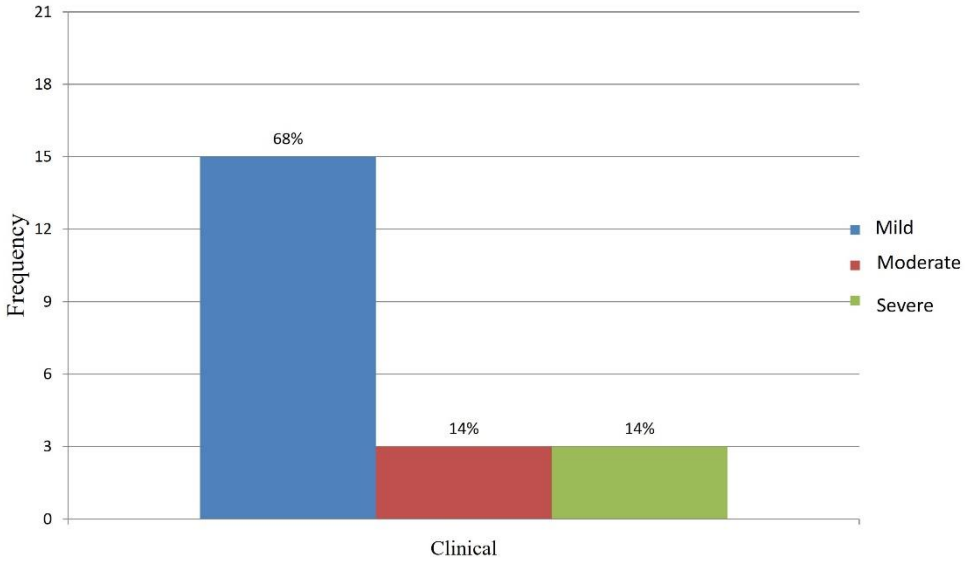

Figure 1. Proportion of COVID-19 patients in Bengkulu City who were able to get a full recovery in 2020 who tested positive for anti-SARS-CoV-2 IgG antibodies.

Graph 1 data shows that the frequency of research subjects who experience moderate degrees of manifestation is the same as those who experience severe degrees of manifestation, as many as three people each (14%). The majority of research subjects had a mild degree of manifestation, as many as 15 people (68%).

An explanation of the correlation between the level of anti-SARS-CoV-2 IgG antibodies and the severity of clinical manifestations in confirmed recovered COVID-19 patients.

A association between the levels of clinical symptoms and Anti-SARS-CoV-2 IgG antibodies in COVID-19 patients who were restored in Bengkulu City in 2020 was analyzed and the results are presented in Table 4.

Table 4 Study on COVID-19 patients in Bengkulu City who were healed in 2020: correlation between anti-SARS-CoV-2 IgG antibody level and severity of clinical manifestations

Degree of Clinical Manifestations		Antibody Levels		N (%)	r	p.s
		Lowest Rate	Highest Rate			
	Mild	0	82.54	15(68%)	0.890	0.00
	Moderate	53.68	112.32	3(14%)		
	Severe	126.84	149.31	3(14%)		

There is a very significant association between the degree of clinical symptoms and IgG antibody levels when COVID-19 patients in Bengkulu City are confirmed to have recovered in 2020, as shown by the Person Correlation value of 0.890 in Data Table 4. In addition, the data obtained indicates that the Person Correlation value is positive, indicating that the direction of the relationship between these variables is positive. This indicates that the greater the antibody level, or the antibody level in COVID-19 patients who have been proven to have recovered. After it was established that COVID-19 patients in Bengkulu, 2020, have recovered, this investigation was carried out to ascertain the correlation between the level of clinical symptoms and the level of IgG antibodies. Patients with COVID-19 who got treatment at the M. Yunus Regional General Hospital in Harapan and Prayer Hospital in Bengkulu City between September 2020 and October 2020 and whose fix had been checked by RT-PCR filled in as the study's research subjects. Based on the patient's medical record's history, the study's conclusions

were drawn. Back in 2020, Sijia et al. found that fever (82.1%), thirst (45.8%), exhaustion (26.3%), dyspnea (6.9%), and headaches (6.5%) were the most common symptoms at the beginning of the disease. There is some support for this. Among the 117 COVID-19 patients seen in September and October 2020 at Bengkulu City's M. Yunus Hospital and Harapan and Prayer Hospital, the most common clinical signs were fever and hacking cough. The majority of patients receiving treatment experienced severity or degree moderate clinical manifestations. Agus et al. (2021) included in the research was the fact that 69% of the 413 COVID-19 patients who received treatment at Jakarta's Wisma Atlet Kemayoran National Emergency Hospital between March 23, 2020, and April 30, 2020, reported only minor or no symptoms at all. (Susanto *et al.*, 2021) Prior research has demonstrated that there is variation in the severity of clinical manifestations brought on by COVID-19 patients in Bengkulu City. Of the hospitals, Prayer Hospital, Bengkulu City, and M. Yunus Regional General Hospital, Harapan, have reported the highest level of manifestation, with 54 cases of moderate to mild pneumonia. Additionally, the severity of additional clinical symptoms was tracked down in 13 cases for moderate cases, 21 cases for extreme cases, and 17 cases for serious cases. As of 2022, Rizqoh et al. According to the study's findings, which show the distribution of clinical manifestation degrees among research participants who were COVID-19 patients who were officially restored between September 2020 and October 2020, the majority of study participants 15 individuals experienced mild clinical manifestations, trailed by three patients who had moderate clinical manifestations and three patients who had clinical manifestations weighing three or more. Regarding the severity of clinical indications and the amount of Anti-SARS-CoV-2 IgG antibodies, a 2020 Pearson correlation analysis was performed among confirmed recovered COVID-19 patients in Bengkulu City. The significance value was 0.000, and the correlation coefficient was 0.890. The results are in line with those of a study by Wenting et al. (2020) that found a direct proportional relationship between the titers of SARS-CoV-2 specific IgM and IgG and the severity of reactions in patients with severe and non-serious cases. (Tan *et al.*, 2020). Upon confirming restoration using (-) RT-PCR, the amount of Anti-SARS-CoV-2 IgG antibodies was shown to be closely proportional to the severity of clinical symptoms ranging from mild to severe in this study. Fifteen participants, or 68% of the total, had only moderate symptoms, with antibody levels ranging from zero to eighty-2.54, according to the study's findings.

Three study participants (14% of the total) exhibited mild to moderate clinical symptoms, with antibody levels going as low as 53.68 to 112.32 at the lowest level and as high as 126.84 to 149.31 at the highest level. Upon confirmation of recovery using (-) RT-PCR data, this study shows that the amount of anti-SARS-Cov-2 IgG antibody will rise in relation to the intensity of clinical symptoms. Furthermore, no participants with severe clinical manifestations exhibited decreased levels of anti-SARS-Cov-2 IgG antibodies compared to subjects with mild or moderate clinical indications. The Liaison XL reagent SARS-CoV-2 S1/S2 IgG was used to determine IgG titers in the investigation conducted by Hassan et al. (2020). The researchers next used chemiluminescence immunoassay to measure the IgG response; the findings corroborated the previous study's finding that symptomatic individuals exhibited higher levels of IgG response. Titers peak in the third month after symptoms begin, and IgG levels rise more steadily in symptomatic individuals than in asymptomatic ones during the first three months. This study's results are in line with those of a 2020 study by Bicheng et al., which showed that patients experiencing severe COVID-19 symptoms frequently had Anti-SARS-IgG antibody levels of 116.9 AU/mL or higher, compared to patients exhibiting milder symptoms who had lower levels of IgG SARS-Cov-2 antibodies of less than or equal to 116.9 AU/mL. That quantities of Anti-SARS-CoV-2 IgG antibodies persist through the healing phase is related to how complicated antibodies function to eradicate infections. (Zhang *et al.*, 2020). The study found that one participant had a significant level of SARS-CoV-2 infection but a lower Anti-SARS-Cov-2 IgG antibody titer, in comparison to patients with milder clinical symptoms. Many factors might be at play here, such as the patients' co-infections and comorbidities. The PCB-19 study participant, for instance, may have been at fault because of their moderate clinical symptoms despite a low antibody titer and a history of hypertension. Patients infected with SARS-CoV-2 who undergo treatment often experience

hypertension as a comorbidity. 2020, in the fall. Songjiang et al. (2020) found that out of 331 COVID-19 patients, the most common comorbidities were hypertension (36.5%) and diabetes (15.5%), followed by cerebrovascular disease (6.8%) and cardiovascular disease (6.1%). Additional evidence for this study was presented by Qiang et al. (2020), who reported that hypertension is the most common comorbidity in the about half of the people with SARS-CoV infection-2. A history of hypertension was present in around 30–35% of COVID-19 individuals. The regulation of pro-inflammatory cytokines by SARS-CoV-2 infection is analogous to hypertension. Hypertension in COVID-19 individuals is caused by an imbalance in the renin-angiotensin system (RAS); abnormalities in the NADH/NADPH oxidase system may lead to excessive inflammatory reactions or the release of many cytokines, which in turn increases lactate dehydrogenase (LDH). increased erythrocyte sedimentation rate The vasoconstriction lung damage caused by SARS-CoV-2 infection is exacerbated by high levels of interleukin-6 (IL-6), D-dimer, C-reactive protein, and serum ferritin, which in turn leads to a poor prognosis. This means that although COVID-19 patients with hypertension exhibit moderate to severe symptoms, their IgG, IgM, and IgA antibody titers are relatively low. (Zeng *et al.*, 2020).

4. Conclusion and future scope

Patients at M. Yunus Regional General Hospital, Harapan dan Doa Hospital, Bengkulu City, who were admitted between September 2020 and October 2020, experienced a mild case of COVID-19. After confirmed (-) RT-PCR, COVID-19 patients with severe SARS-CoV-2 symptoms had a higher quantity of Anti-SARS-Cov-2 IgG Antibodies. The quantity of Anti-SARS-Cov-2 IgG Antibodies in COVID-19 patients is directly correlated with the severity of clinical symptoms after confirmed (-) RT-PCR.

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Conflict of Interest

Author declared that there is no conflict of interest.

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