Differences in Immunoglobin a Levels in Breast Milk Between Mothers with and without the Covid 19 Vaccine

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ABSTRACT

Giving the vaccine to breastfeeding mothers will provide immunity to the baby through the placenta, umbilical cord (IgG) and breast milk (IgA). The purpose of this study was to analyze differences in IgA levels in breast milk in breastfeeding mothers with the Covid 19 vaccine and without the Covid 19 vaccine. This study used an observational comparative analytic study in 2 unpaired groups with a cross sectional design. The research sites for taking breast milk were in the Working Area of Paal Merah I Public Health Center, Jambi City, PMB Rosmala Aini and the Biomedical Laboratory of the Faculty of Medicine, Andalas University for the assessment of breast milk IgA levels. The population in this study were all breastfeeding mothers who had received the Covid-19 vaccine stage 1 and stage 2 and as controls were all breastfeeding mothers who had not received the Covid-19 vaccine in the Paal Merah I Health Center Work Area and PMB Rosmala Aini Jambi City. a sample of 40 respondents. In the univariate analysis, the normality of the data was tested first using Shapiro Wilk. In Bivariate analysis to see the difference in IgA levels with unpaired t test if the data is normally distributed (p value> 0.05), if the data is not normally distributed (p value 0.05) an alternative test is used, namely Mann Whitney. The results showed that the average level of Immunoglobin A in breastfeeding mothers with the Covid-19 vaccine was 2.30 ± 0.44 ng/ml, while the average level of Immunoglobin A in breastfeeding mothers without the Covid-19 vaccine was 2.54 ± 0.45 ng. /ml. The results of the independent t test found that the P-value was 0.10, so it can be concluded that there is no difference in the levels of Immunoglobin A in breast milk between breastfeeding mothers with the Covid-19 vaccine and without the Covid-19 vaccine. The conclusion of the study is that there is no difference in levels of Immunoglobin A in breast milk both in breastfeeding mothers with the Covid-19 vaccine and without the Covid-19 vaccine.

ABSTRAK

Pemberian vaksin pada ibu menyusui akan memberikan kekebalan pada bayi melalui plasenta, tali pusat (IgG) dan ASI (IgA). Tujuan penelitian adalah menganalisis perbedaan kadar Ig A ASI pada Ibu Menyusui dengan vaksin Covid 19 dan tanpa vaksi Covid 19. Penelitian ini menggunakan jenis penelitian analitik komparatif observasional pada 2 kelompok tidak berpasangan dengan desain cross sectional. Tempat penelitian pengambilan ASI Ibu di Wilayah Kerja Puskesmas Paal Merah I Kota Jambi, PMB Rosmala Aini dan Laboratorium Biomedik Fakultas Kedokteran Universitas Andalas untuk penilaian kadar IgA ASI. Populasi pada penelitian ini adalah seluruh ibu menyusui yang telah mendapat vaksin Covid-19 tahap 1 dan tahap 2 dan sebagai kontrol adalah seluruh ibu menyusui yang belum mendapat vaksin Covid-19 di Wilayah Kerja Puskesmas Paal Merah I dan PMB Rosmala Aini Kota Jambi, dengan jumlah sampel sebanyak 40 responden. Pada analisis univariat dilakukan uji normalitas data terlebih dahulu menggunakan shapiro wilk. Pada analisis Bivariat untuk melihat perbedaan

kadar Ig A dengan uji t tidak berpasangan jika data berdistribusi normal (nilai p>0,05), jika data tidak berdistribusi normal (nilai p≤0,05) digunakan uji alternatif yaitu mann whitney. Hasil penelitian menunjukkan bahwa rerata kadar Immunoglobin A pada ibu menyusui dengan vaksin covid-19 adalah 2,30 ± 0,44 ng/ml, sedangkan rerata kadar Immunoglobin A pada ibu menyusui tanpa vaksin Covid-19 adalah 2,54 ± 0,45 ng/ml. hasil uji independen t test ditemukan bahwa nilai P-value 0,10 sehingga dapat disimpulkan tidak terdapat perbedaan Kadar Immunoglobin A pada ASI antara ibu menyusui dengan Vaksin Covid-19 dan tanpa Vaksin Covid-19. Kesimpulan penelitian bahwa tidak berbeda kadar Immunoglobin A pada ASI baik pada ibu menyusui dengan Vaksin Covid-19 dan tanpa Vaksin Covid-19

INTRODUCTION

The number of cases of Covid -19 increased suddenly and reached almost the whole world in a short time. As of May 3, 2021, WHO reported 152,534,452 cases worldwide, with 3,198,528 deaths (Baradaran et al., 2020). Meanwhile, as of May 3, 2021, there were 1,682,004 confirmed cases of Covid-19 in Indonesia, 45,949 people died, and 1,535,491 people have recovered (Alfiana et al., 2021). In a smaller scope, in Jambi Province, there has also been a sharp increase; as of May 3, 2021, 7890 Covid-19 cases, 121 deaths, and 6276 recovered (Septina, 2022).

For this reason, urgent interventions are needed that do not only focus on implementing health protocols but also other effective interventions, especially vaccination. The COVID-19 vaccination aims to reduce the transmission/transmission of COVID-19, reduce morbidity and mortality due to COVID-19, achieve herd immunity, and protect the community from COVID-19 to remain socially and economically productive (DeRoo et al., 2020; Razai et al., 2021).

Breastfeeding mothers are a group at risk of contracting COVID-19. During the pandemic, access to essential services such as breastfeeding counseling in hospitals, health clinics, and home visits is hampered. Therefore, breastfeeding mothers are the primary target recipients of the Covid-19 vaccine, which is related to immunity in infants through the placenta, umbilical cord (IgG), and breast milk (IgA) (Kusumaningrum & Sari, 2021; Rosa, 2022).

IgA in breast milk can protect infants from infection and death. The antibodies (mainly IgA and IgG) produced by the vaccine are excreted in breast milk, thus enabling the vaccinated breastfeeding mother to protect the baby passively. The antibody content in breast milk will protect infants against respiratory viral infections due to the transfer of specific antibodies to viral pathogens from breast milk to infants (Fadilah & Setiawati, 2021; Zaki et al., 2022).

The results of the (Valcarce et al., 2021) study on 22 breastfeeding mothers stated that breast milk IgA was statistically significant increased from TP1 (before the Covid-19 vaccine) to TP2 (first dose of Covid-19 vaccine) (p<0.0007) and from TP1 to TP3 (vaccine covid 19 third dose) (p < 0.0001).

Antibodies resulting from interactions with vaccines will protect breastfeeding women and infants. The American College of Obstetricians and Gynecologists recommends administering the COVID-19 vaccine to breastfeeding mothers (Guida et al., 2021; Jakuszko et al., 2021; Perl et al., 2021).

The availability of an effective and safe vaccine does not guarantee the program's success as expected. The distribution of vaccines is quite complicated and must be prepared carefully - and involves up to millions of officers. For that, the community's acceptability factor must be appropriately handled and carefully because not a few people refuse to be vaccinated for various reasons. The rejection of vaccination is not only faced by Indonesia, but this has become a world problem that has also become a concern for WHO. From various studies so far, it is known that people refuse or doubt could be the lack of information about the need for vaccines, misperceptions about the content of vaccines, halal aspects, and specific personal/group considerations that may develop (Arina, 2021; Helmi et al., 2021).

Based on the 2021 National survey of 1200 respondents, as many as 15.8% of respondents were willing to be vaccinated, 39.1% were quite willing to be vaccinated, 32.1% were not willing, 8.9% were very unwilling, and 4 2% answered do not know (Yamali & Putri, 2020). The specific objectives of this study were to analyze the levels of Ig A in breast milk in breastfeeding mothers with the Covid 19 vaccine, analyze the levels of Ig A in breast milk in breastfeeding mothers without the Covid 19 vaccine, and analyze the differences in the levels of Ig A in breast milk between breastfeeding mothers with the Covid 19 vaccine and without the Covid 19 vaccine.

METHODS

This study uses an observational comparative analytic study in 2 unpaired groups with a cross-sectional design that has been carried out in October-December 2021. The research site for taking breast milk is in the Working Area of the Paal Merah I Health Center, Jambi City, PMB Rosmala Aini tian and the Biomedical Laboratory of the Faculty of Medicine, Andalas University for the assessment of IgA levels in breast milk. The case samples in this study were 20 nursing mothers who had received the Covid-19 vaccine stage 1 and stage 2 in the Working Area of the Pal Merah Health Center I Jambi City and had no history of suffering from Covid 19 while breastfeeding mothers who had received the Covid-19 vaccine stages 1 and 2. but suffering from COVID-19 were excluded from the study. The control sample was 20 breastfeeding mothers who had not received the COVID-19 vaccine at PMB Rosmala Aini, Jambi City, and never had a history of suffering from COVID-19.

The research instrument contains the characteristics of the respondents in this study consisting of age, parity and educational status then the results of the examination of IgA levels in breast milk between Breastfeeding Mothers with Vaccines and Without Covid-19 Vaccines.

Data collection begins by asking the willingness of prospective respondents, after agreeing to become a respondent then the respondent then signs the informed consent. In this study, there were 3 research locations, namely the Paal Merah I Public Health Center in Jambi City, PMB Rosmala Aini tian and the Biomedical Laboratory, Faculty of Medicine, Andalas University. The working area of the Paal Merah I Health Center in Jambi City is as a place to collect data from case samples, while PMB Rosmala Aini Jambi City is a place to collect data from control samples. The place where the IgA level of breast milk is checked is at the Biomedical Laboratory, Faculty of Medicine, Andalas University.

Research data analysis using independent test t-test to test the differences between variables. The SPSS version 16.0 application was used to analyze the research data, where variables with a P-value <0.05 were considered significant.

RESULTS AND DISCUSSION

This study describes respondents' characteristics, including age, parity, and education. The following is the result of the frequency value of the respondents' characteristics in the Regional Health Center of Pal Merah I Jambi City in table 1:

Table 1
Characteristics of Respondents in the Working Area of Pal Merah Health Center I Jambi City

Characteristics	Group				Total
	Vaccinated		Not Vaccinated		
	n	Mean ± SD	n	Mean ± SD	
Age (years)	20	29,70 ± 6,15	20	25,90 ± 4,68	
20-25	6 (30)		11 (55)		17 (85)
26-32	12 (60)		7 (35)		19 (95)
33-38	2 (10)		2 (10)		4 (20)
Parity					
Primipara	9 (45)		10 (50)		19 (47,5)
Multipara	11 (55)		10 (50)		21 (52,5)
Educational level					
High	18 (90)		14 (70)		32 (80)
Low	2 (10)		6 (30)		8 (20)

Table 1 shows that the average age in the group of breastfeeding mothers without the Covid-19 vaccine is 25.90 ± 4.68 years, which is lower than the group of breastfeeding mothers with the Covid-19 vaccine with the distribution in the majority case group aged 26-32 years, while in the group the majority of cases are 26-32 years old. The majority of cases are in the age range of 20-25 years. In the group of breastfeeding mothers with the Covid-19 vaccine, the majority with multipara parity were 11 people (55%). The majority of breastfeeding mothers with the Covid-19 vaccine are highly educated with a total of 18 (90%).

Table 2
Differences in IgA levels in breast milk between vaccinated and unvaccinated breastfeeding mothers

Group	n	Breastmilk Immunoglobin A Level (ng/ml)		P-value
		Mean	SD	
Vaccinated breastfeeding mothers	20	2,30	0,44	0,100
Unvaccinated breastfeeding mothers	20	2,54	0,45	

Table 2 shows the levels of Immunoglobin A in breast milk in the vaccinated and unvaccinated breastfeeding mothers with a p-value of 0.100 (p>0.05). These results confirm no difference in Immunoglobin A levels in breast milk between vaccinated and unvaccinated breastfeeding mothers. The average level of Immunoglobin A in vaccinated breastfeeding mothers was 2.30 ± 0.44 ng/ml, while in unvaccinated breastfeeding mothers, it was 2.54 ± 0.45 ng/ml.

The results of the study can be reported that the distribution in the majority case group is 26-32 years old, while in the majority case group the age range is 20-25 years. In the group of breastfeeding mothers with the Covid-19 vaccine, the majority with multipara parity were 11 people (55%). The majority of breastfeeding mothers with the Covid-19 vaccine are highly educated with a total of 18 (90%). This is in line with the findings of previous studies which reported that the majority of respondents aged 20-35 years were 34 (81%), had higher education as many as 22 (52.4%), and had a parity of 2-4 times (54.8%).

Age is related to the desire to carry out the covid 19 vaccine. This is probably because at that age they have a more dynamic lifestyle with a high level of socialization. They often gather and discuss to complete a job in the office. Then during breaks and after working hours, one way to unwind and tired is to visit the nearest cafe or restaurant. Activities that used to be routine during normal times are now at risk of transmission during a pandemic. In addition, there are still many people who think that young people are more resistant to Covid-19, but in fact this has contributed to the number of infections among productive age, highly educated and working people.

These results prove the presence of IgA in the vaccinated breast milk of nursing mothers. Based on data analysis in this study, it was found that there was no difference in Immunoglobin A levels in breast milk between vaccinated and unvaccinated breastfeeding mothers.

Poon et al (2021) study of vaccine response in 131 pregnant, nursing, and non-pregnant women found an increase in SARS-Cov-2-specific IgA levels after the first vaccine but no increase after the second vaccine.

In another study, Juncker et al (2021) examined the levels of specific antibodies to SARS-Cov-2 in the breast milk of nursing mothers. The level of SARS-Cov-2-specific IgA in maternal breast milk increased by 2.4 times after 35 days of the first dose. However, on day seven after administration of the second vaccine, the SARS-Cov-2-specific IgA level gradually decreased to as much as 33%.

In a prospective cohort study conducted by Gonçalves et al (2021) on 24 workers (14 breastfeeding mothers and ten non-breastfeeding mothers) after receiving BNT162b2 breast milk, IgA levels increased by 35.7% after receiving the first dose. However, they decreased to 21.4% after receiving BNT162b2 Second doses.

IgA in breast milk represents 90% of antibodies, but only 10% is absorbed in the intestine and transferred to the bloodstream. IgA antibodies are considered the essential immunoglobulins in colostrum and are produced by the mother's mammary glands. IgA also provides important antimicrobial defenses for the neonatal gastrointestinal tract by inhibiting pathogens on mucosal surfaces, neutralizing microbial toxins, and providing passive immunity. IgA Protects the body against respiratory and gastrointestinal infections. Breast milk contains large amounts of sIgA. sIgA was created to survive on the mucous membranes of the respiratory and digestive tracts and is resistant to proteolytic enzymes of the digestive tract (Low et al., 2021).

The results of this study are also following a study conducted by Lechosa-Muñiz et al (2021) on 110 breastfeeding mothers who had received two doses of BNT162b2, mRNA-1273, and one dose of ChAdOx1-S vaccine to detect the presence of IgA and IgG antibody levels in the serum and breast milk of nursing mothers. Mothers who have received COVID-19 vaccination can produce specific antibodies against SARS-CoV-219 in breast milk. Breast milk given to children will be more valuable because breast milk contains specific antibodies that can prevent virus exposure (Juncker et al., 2021).

The results of this study recommend giving COVID-19 vaccination to breastfeeding mothers. Breastfeeding mothers who have received the second dose of Sars-Cov-2 vaccination with various Sars-Cov-2 vaccines contain IgG and IgA in breast milk. Protection in children against respiratory infections due to the transfer of specific antibodies to viral pathogens from breast milk to children. Mothers who have received the COVID-19 vaccination can produce specific antibodies against SARS-CoV-2. Breast milk given to babies will be more valuable because breast milk contains specific antibodies that can prevent viral exposure. There is an effect after vaccination, namely specific antibodies are found in breast milk so that it protects the baby against COVID-19 (Fox et al., 2021; Trofin et al., 2022).

More than one week after giving the second dose of vaccination, both Moderna mRNA-1273 and Pfizer-BioNTech vaccines were found to have an average increase in anti-spike protein IgA from 18 units/ml to 1000 units/ml, and anti-spike protein IgG also increased. from 67 units/ml to 552 units/ml in breast milk. In addition to anti spike SARS-CoV-2, Anti-SARS-CoV-2 RBD IgA and IgG also experienced a similar increase. Mother's milk produced by vaccination contains specific IgA and IgG which have the ability to neutralize the virus so that it can be given to infants aged 0-2 years (Charepe et al., 2021).

Vaccination with both Moderna mRNA-1273 and Pfizer-BioNTech elicited a higher antibody response than infection. As is the case after vaccination against other viruses, the antibodies (mainly IgA and IgG) produced by the vaccine are excreted in the breast milk of vaccinated nursing mothers, allowing vaccinated breastfeeding mothers to passively protect their children (Lechosa-Muñiz et al., 2021). The antibody content in breast milk will provide protection in children against respiratory viral infections due to the transfer of specific antibodies to viral pathogens from breast milk to children (Demers-Mathieu et al., 2021).

This study has several limitations and shortcomings. This study used a cross-sectional design, and observations were made only at one time. In this study, the levels of secretory IgA in breast milk before and after the vaccine were not checked, so no change in the secretory IgA in breast milk could be seen before and after receiving the Covid-19 vaccine. Differences in IgA concentrations in maternal breast milk can also be caused by differences in maternal gestational age, nutritional status, maternal parity, maternal age, exposure to infection, differences in breastfeeding methods, or differences in maternal psychological conditions or aspects of maternal stress (Jorgensen et al., 2022).

LIMITATION OF THE STUDY

The limitation of this study is that it only takes 1 Puskesmas area so that it cannot compare the results of this study with adolescent respondents from other Puskesmas areas.

CONCLUSIONS AND RECOMMENDATION

Obtained levels of IgA in breast milk in vaccinated breastfeeding mothers. There was no difference in breast milk IgA levels in vaccinated and unvaccinated breastfeeding mothers. For further researchers, it is hoped that they can add to the variables studied regarding breast milk IgA levels and analyze factors that can affect breast milk IgA levels.

Conflict of Interest Statement

Authors declared there is no conflict of interest

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