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Impacts of COVID-19 Pandemic on Three IVF Clinics of Jakarta, Indonesia: A Retrospective Qualitative and Quantitative Study

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Abstract

Background: Corona virus disease-19 (COVID-19) pandemic also led to a reduction or even the suspension of elective health services. These decisions affected *in vitro* fertilization (IVF) programs worldwide. Therefore, it is essential to map the readiness of IVF clinics in providing safety in this situation and in the future.

Materials and Methods: This is a retrospective qualitative and quantitative research done in 2021 that involved three IVF clinics of Jakarta, Indonesia. Those three clinics were government-owned, private-owned, and educational and training center. The qualitative data of each clinic's readiness towards COVID-19 was obtained from interviews with the clinics staff. The quantitative data were collected from the clinics patients' number and demographic data from 2019-2021 as well as from COVID-19 databases. Both data sets were analysed descriptively and only for the quantitative analysis Stata version 16 was used.

Results: There were changes in the domiciles and number of patients attending the three clinics. The ratio of patients from Jakarta increased while patients from outside Java Island decreased. There was a drop in annual patient numbers in 2020. However, from June 2020 to December 2021, the number of monthly IVF cycles increased significantly by 3.5 cycles per month (P=0.001). There was no association between IVF patients' attendance numbers and COVID-19 cases (P=0.785). One of the clinics had a negative pressure operating theatre, which made them more confident in treating patients with COVID-19 positive and made them even had higher IVF cycles started than the pre-pandemic period.

Conclusion: Those three clinics are prepared in facing COVID-19, as they complied with government regulations. As the COVID-19 pandemic progressed, the number of patients gradually returned to normal.

Keywords: COVID-19, Indonesia, *In Vitro* Fertilization

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Introduction

Since March 11th, 2020, the World Health Organisation (WHO) declared the Corona virus disease 2019 (COVID-19) a pandemic, healthcare endured significant changes, such as cancelling or postponing non-essential treatments (1, 2) that lead to consequences like a decrease in non-COVID-19 patients' quality of care (3, 4).

This situation has also impacted elective Gynaecological and *in vitro* fertilization (IVF) procedures (5). Also, the Indonesian Society of Obstetrics and Gynaecology, Perkumpulan Obstetri dan Ginekologi Indonesia, (POGI) released a recommendation which recommends any fertility treatment to be postponed. This recommendation was to minimise the risk of infection of COVID-19 (6, 7). However, delay in starting infertility treatment may cause a decrease in the success rate (8).

In Indonesia, along with the nationwide lockdown, there were regulations that suspended elective medical procedures, including infertility treatment. Therefore, infertile couples were affected in many aspects, including psychological (9). However, the relationship between the effects of the COVID-19 pandemic on the number and demographic of IVF patients has not been studied. This study aims to map any changes in patient numbers and demographics attending three different IVF clinics, before and after COVID-19, and clinic preparedness to face the pandemic situation.

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Materials and Methods

Ethical declaration for this study was approved by the University of Indonesia Medical Research Ethics Committee (MREC) in December 2021 (KET-1175/UN2. F1/ETIK/PPM/00/02/2021) and the Monash University Human Research Ethics Committee (MUHREC) (32625).

This research uses sequential exploratory mixed-methods study that included both qualitative and quantitative studies. The participants in this research were clinic management and staffs that were agreed to attended in this study. To map the clinic's preparedness in facing the COVID-19 pandemic, several questions were asked by the management concerning the changes in infectious disease precautions before and after the pandemic, such as its preventive measures, the clinic's sanitation regulations, and staff regulations. We used a semi-structured interview to obtain the primary data. The secondary data are monthly patient number and demographics were obtained from the patients' medical record from January 2019 to December 2022.

Results

This study was conducted from January 2019 to December 2021 at three clinics contains 2570 patients demographic and treatment data. Cohort characteristics are presented in Table 1.

Table 1: Characteristics of *in vitro* fertilization (IVF) Patients' Attendances from three clinics (n=2570)

Characteristics	n (%)
Age (Y)	
<35	1150 (45)
35-37	573 (22)
38-40	422 (16)
41-42	234 (9)
>42	191 (7)
Treatment	
Fresh embryo	1684 (66)
Frozen embryo transfer	886 (34)
Domicile	
Jakarta	1205 (47)
Greater Jakarta	787 (31)
Java Island	163 (6)
Outside Java	415 (16)

The ratio of patients from Jakarta increased during the COVID-19 pandemic, from 43 to 49%. In contrast, patients living outside Jakarta, including the patients from the rest of Java Island and outside of it, decreased in proportion, as can be seen in Figure 1.

Figure 2 presents an overview of the monthly numbers of patients undergoing IVF cycles between 2019 and 2021 in all three clinics, along with events affecting the number of IVF cycles. The events or factors that affected the number of IVF cycles started were ranging from travel restrictions to the Jakarta and two waves of COVID-19, with green and pink shaded areas on the graph. Due to COVID-19 early cases and national holiday combined, the travels were restricted in the 2020, while only national holiday restricted 2021 travels.

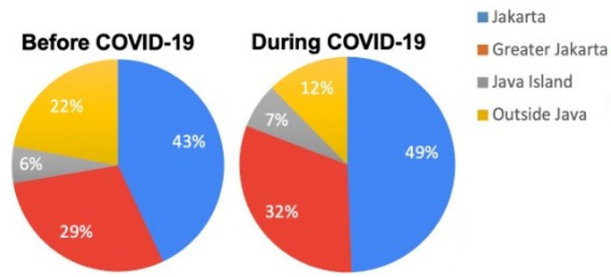

Fig.1: *In vitro* fertilization (IVF) patient origins proportion from overall three surveyed clinics.

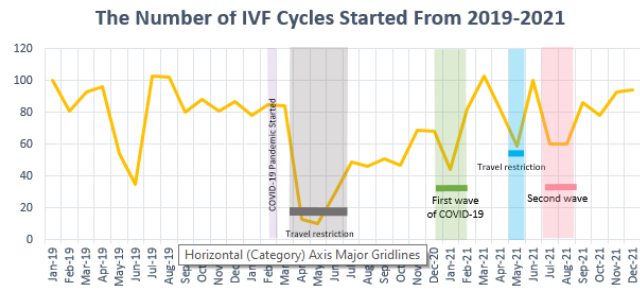

Fig.2: Monthly numbers of patients' attendance from 2019 to 2021 in all three *in vitro* fertilization (IVF) Clinics.

Using Stata version 16, the impact of the COVID-19 pandemic on the number of patients per month was analysed. The starting number of IVF cycles was 84 per month and the total number of IVF cycles appeared to be similar before March 2020 (-0.1, 95% CI −1.5 to 1.3, P=0.859). In the first month of the COVID-19 pandemic in Indonesia, which is March 2020, there was appeared to be a significant decrease in IVF cycles (-53.0, 95% CI −70.3 to -35.7, P<0.001), followed by a significant increase in the monthly trend of IVF cycles (relative to the pre-intervention trend) of 3.5 IVF cycles per month (95% CI 1.7 to 5.4, P=0.001), which is illustrated in Figure 3.

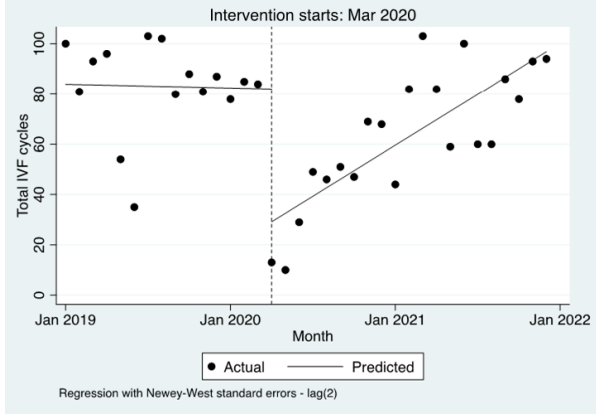

Fig.3: The impact of COVID-19 on total *in vitro* fertilization (IVF) cycles in all three hospitals, tested with regression with Newey-West standard errors.

A remarkably high number of IVF cycles done from January to March 2020, followed by a noticeable drop in April and almost no patients in May 2020. This drop was mainly caused by POGI's regulations to cancel the elective procedures, including IVF services. This regulation was relaxed in July 2020. In April 2021, there was a decrease in monthly IVF cycles, as there were the first and second wave peaks of COVID-19 cases in January 2021 and July-August 2021, respectively. All three clinics shared similar trends throughout the pandemic in 2020 and 2021. Overall clinics IVF patient number and COVID-19 cases comparison is illustrated in Figure 4.

Based on the linear regression result in the statistical software Stata, there was no association (P=0.785) between the monthly national COVID-19 cases and the monthly number of IVF cycles. There was also no association (P=0.640) between monthly Jakarta COVID-19 cases and the monthly number of IVF patients.

The emergence of COVID-19 forced the hospital to postpone or cancel various elective medical procedures, including IVF treatments and clinics. After two years of the pandemic, there were changes in numerous clinical and non-clinical protocols due to COVID-19. All different preparedness aspects from the interviews with clinics staffs are summarised in Table 2.

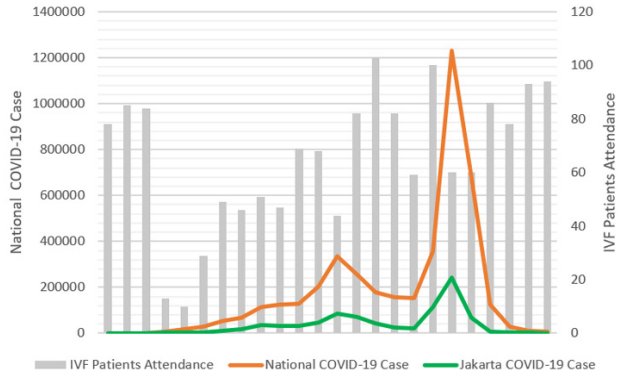

Fig.4: Monthly COVID-19 cases and monthly *in vitro* fertilization (IVF) cycle started in all three clinics.

Table 2: Summary of clinic preparedness in facing COVID-19

	Teratai	Yasmin	Melati
Preventive measures			
High-efficiency particulate absorbing (HEPA) filter air purifier	✓	✓	✓
Negative pressure OR	×	×	✓
Personal protective equipment is worn by staff	✓	✓	✓
COVID-19 testing for patients	✓	✓	✓
COVID-19 testing for staff	✓	✓	✓
Timetabling to reduce clinic traffic	✓	✓	✓
Partner restrictions to appointments	×	✓	✓
Keep safe distance	✓	✓	✓
Vaccine requirement to enter	✓	✓	✓
Prior to treatment COVID-19 exposure questionnaire	✓	✓	✓
Provide teleconsultation	✓	✓	✓
Sanitation regulation			
Operating Room is cleaned by the same staff	×	✓	✓
Electronic devices are covered with plastics	✓	✓	✓
Disinfected routinely	✓	✓	✓
Frequency	UV light exposure every day and disinfectant after every patient	×	After every patient
Regulations for non-medical and medical staff			
Hand washing	✓	✓	✓
Steps of wearing personal protective equipment	✓	✓	✓
Personal protective equipment level 1, 2	✓	✓	✓
Personal protective equipment level 3 (how to wear, how to take it off, and disposal)	✓	×	×
Individual meal breaks	✓	×	✓
Travelling staff monitoring	✓	×	×

Discussion

COVID-19 pandemic also led to a reduction or even the suspension of elective health services, including IVF treatment worldwide. IVF treatment, as well as its patient number, is highly affected by multiple factors, such as mobility and IVF clinics' readiness.

The increase of patients from Jakarta and Greater Jakarta was a consequence of mobility/ transport restrictions from the government. While the entry and exit points to and from Jakarta were blocked, the desire of IVF patients from outside Jakarta to travel to Jakarta was affected (10).

Based on the Indonesian Association for *In vitro* Fertilization (IAIVF) website registry, there was a gradual increase in the IVF cycle number from 2016 to 2019. This survey found that the annual patient numbers for three clinics decreased during 2020, the first year of the pandemic. This decrease might have been caused by POGI's regulations that restricted the elective procedures from May to July 2020. However, in 2021, the patient numbers had increased gradually, yet still lower compared to in 2019. Exceptionally, Melati IVF Clinic had a higher patient number in 2021 than the pre-pandemic period. Although, our results of these three clinics showed a lower patient number in comparison with the period before the pandemic period started, was contrary to a study done by Cutting et al. (11). They found an increase in patient load for IVF treatment after the lockdown period in the Indonesia by 25-50%. This contradiction may be because of considering only one clinic and mainly its location. Correlating with the lower desire of patients to travel to Jakarta, we assumed that patients prefer transferring to their nearer IVF clinics. Hence, there were IVF clinics outside Jakarta to have increased patient load, although IAIVF website registry data shows that most IVF clinics had declined trend during 2020 and 2021.

A study in Finland showed that there was an average 8% increase in waiting times of elective treatments in 2020, from 85.8 days before the pandemic to 92.6 days, which eventually led to decrease the patient number (12). This decreased in the patient load also happened worldwide, including in Indonesia (13). The result showed patients reduction in 2020, which indicates there were some procedural cancellations that led to delays in IVF treatment.

All three clinics recorded the lowest number of IVF cycles started in May for three years in a row, even before the pandemic occurred. This is because during the last three years, Ramadhan falls in May. Ramadhan is a sacred month for Muslims. During this month, Muslims are fasting from dusk till dawn, ranging from 12 to 19 hours (14). Almost 80% of the Indonesian population are Muslim and they tend to delay any IVF treatment during that period. Although, there is no significant effect found in the foetal growth, but the patients often feel dehydrated and uncomfortable to undergo any medical procedures (15). Those studies (16, 17) indicated there are some conditions, such as feeling dehydrated, and tendency to focus on praying that make patients have to postpone their treatment until after Ramadhan.

After POGI relaxed the elective treatment prohibition in July 2020, IVF patients seemed eager to start the treatment cycle, since both IVF patients and clinics are more prepared towards COVID-19. It was supposed that the infertility may be located at in the first line of stress for infertile couples rather than of the COVID-19 disease infection. According to other studies, stress levels in infertile couples are similar to those found in patients suffering from life-threatening illnesses (16-18). Vaughan et al. (19) stated that only 6% of the respondents agreed that assisted reproductive technology should be suspended during the pandemic.

Prior to the pandemic, from January 2019 to March 2020, the number of patients' attendance to those three IVF clinics higher compared to during the pandemic. During the first and second waves of the COVID-19 pandemic, there was a decline in IVF cycles in Indonesia, January 2021 and July-August 2021, respectively. However, the statistical analysis showed a gradual increase of IVF cycles, 3.5 cycles per month. This trend was due to the more prepared IVF clinics and patients feel more confident to visit IVF clinics.

Clinics tend to limit the patient load, as the pandemic indeed significantly caused impacts on healthcare professionals (20, 21). Although, it is causing patients backlog, a solution implemented among all IVF clinics surveyed in this research is by providing telehealth prior to face-to-face consultation in the clinic. This telehealth solution is in line with a study done by Hernández et al. (22), in which it was stated that telehealth might provide the obstetric gynaecologists better understanding of patient prognosis.

Due to the absence of a detailed and formal protocol, there was no standardised workflow within and between IVF clinics in Jakarta. The interviews showed that all three IVF clinics interviewed had followed the WHO guidelines, including providing personal protective equipment, training on using them, and hand hygiene education. Also, in line with WHO, routine screening was done on high-risk staff, which was extended to all staff when there was a significant increase in COVID-19 cases (23).

Concerning the high-exposure risk procedures, for instance, the ovum pick-up, all clinics required couples to have negative COVID-19 test results prior to the ovum pick up. Even though all clinics already had high-efficiency particulate absorbing (HEPA) filters in both operating and examining rooms, the only Melati IVF Clinic has equipped negative pressure operating theatre. Negative pressure operating rooms are involved in performing surgical procedures on patients who have airborne infectious illnesses (24). However, research done

by Rosenbaum et al. (25) reported that a portable HEPA filter is a sufficient alternative for the negative pressure individual rooms or units, which was already available in all three clinics, even though it is not suggested to be used for the COVID-19 positive patients.

Conclusion

To conclude, those three clinics are prepared in facing COVID-19, as they complied with government regulations. As the COVID-19 pandemic progressed, the number of patients gradually returned to normal, although there were any changes in the proportion of patients' domicile, the monthly number of patients and clinics' protocols due to the COVID-19 pandemic. Therefore, it is essential to create a formal regulation for IVF clinics worldwide to give the highest quality yet maintain everyone's safety.

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Authors' Contributions

F.A.; Data collection, Data processing, Manuscript conception, and Submission. M.P.; Supervision, Project development, and Manuscript editor. S.W.L.; Co-supervisor and Data collection. G.P.; Co-supervisor and Data collection. All authors read and approved the final manuscript.

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