

# Seroprevalence of (COVID-19) Infection in First Trimester Abortion; Cross Sectional Study

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## Abstract

**Background:** There are no sufficient data available on spontaneous abortions caused by COVID-19 during the first trimester of pregnancy, despite the large and rapidly growing cases worldwide.

**Objective:** To measure Seroprevalence of covid-19 infection among females with 1st trimester spontaneous abortion and association between COVID-19 infection and first trimester spontaneous abortion.

**Patients and Methods:** Our study conducted on 100 abortive cases in 1st trimester with special criteria who were referred to Ain Shams University Maternity Hospital, underwent to rapid test of covid-19.

**Results:** 73% of cases with positive antibodies have past history of COVID-19 symptoms or contact with confirmed COVID-19 patient. Incidence of missed abortion increase with COVID-19 infection. Employed pregnant females are at higher risk of infection than unemployed females. Our study provides reassuring findings for women who intend to become pregnant during the SARS-CoV-2 pandemic or who became infected during their first trimester of pregnancy. COVID-19 appears to have a favorable maternal course at the beginning of pregnancy.

**Conclusion:** Our study provides reassuring findings for women who intend to become pregnant during the SARS-CoV-2 pandemic or who became infected during their first trimester of pregnancy. COVID-19 appears to have low risk of maternal complication at the beginning of pregnancy.

**Key words:** covid-19; first trimester abortion; serology

## Introduction

The World Health Organization named the new severe acute respiratory syndrome coronavirus 2 (COVID-19) disease coronavirus disease 2019 (COVID-19) and declared it a pandemic. Coronaviruses are enveloped, non-segmented, positive-sense RNA usually responsible for mild illness such as the common cold in adults and children (*Fehr and Perlman, 2015*).

However, in the last decade, coronaviruses have caused 2 important epidemics: severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). COVID-19 was first reported in Wuhan (China) in December 2019 followed by outbreaks across the world (*Zhu et al., 2020*). Despite the rapidly growing number of cases worldwide, data on COVID-19 during pregnancy remain limited, being derived mainly from small sample studies (*Yan et al., 2020*).

A systematic review of published reports on coronaviruses (COVID-19, SARS, MERS) reported higher rates of preterm birth, preeclampsia, cesarean delivery, and perinatal death (*Di Mascio et al., 2020*). The lack of data on spontaneous abortion because of COVID-19 during the first trimester precludes extrapolation of conclusive evidence for the effects of infection during early pregnancy. The paucity of reliable data has aroused concern in patients, and the disinformation reported by the media may lead pregnant women to embrace dramatic choices such as voluntary abortion (*Wu et al., 2020*). The wide range of clinical expression, the high rate of asymptomatic forms, and the poor accuracy of nasopharyngeal swab testing and its limited availability have been the main barriers to gaining a real understanding of the prevalence of the infection and its impact on pregnancy (*Cosma et al., 2020*). In this complex scenario, the development of serologic tests for the detection of (COVID-19) immunoglobulin G (IgG) and immunoglobulin M

(IgM) could be useful to identify pregnant patients who were infected during early pregnancy. Although the quantity and quality of data on test performance are still limited, the level of accuracy has been reportedly moderate to good, so that patients infected by (COVID-19) can be traced (Tré-Hardy *et al.*, 2020).

### Aim Of the Work

To measure Seroprevalence of covid-19 infection among females with 1<sup>st</sup> trimester spontaneous abortion. To study association between previous covid-19 infection and 1<sup>st</sup> trimester spontaneous abortion.

### Patients and Methods

#### Technical design:

**Type of Study:** A cross sectional study.

**Study Setting:** Department of Obstetrics and Gynecology at Ain Shams University Maternity Hospital.

**Study period:** the study started is December 2022 and ended in June 2023 for 7<sup>th</sup> months after reach the required sample size.

**Sample size:** The study was conducted on 100 abortive cases in 1<sup>st</sup> trimester. Using PASS 11 power program for sample size calculation, reviewing results from previous relevant study (Cosma *et al.*, 2021) showed that 10.2% of women with first trimester spontaneous abortion had a positive test result for coronavirus diseases, with a margin of error = 5%, and 90% confidence level, a sample size of at least 100 patients were needed.

**Inclusion criteria:** Women aged 18:35 years. Body mass index 18.9: 24.9 kg/m<sup>2</sup>. Aborted cases less than 13 weeks. All types of abortion were included in the study (missed abortion, inevitable abortion complete and incomplete abortion).

#### Exclusion criteria:

**Was to exclude other causes of abortion:** Women with any known systemic diseases or endocrine disorders. Women with aberrant causes of recurrent pregnancy loss as: General causes: maternal medical as DM or immunological diseases as APS. Local causes: uterine or cervical anomalies. Fetal causes: multiple pregnancy and structural CFMF. Patient not able to communicate adequately with the investigators and to comply with the requirements of the entire study. Unwillingness to give written informed consent.

#### Operational design:

**Type of study:** A cross sectional study

**All cases who met inclusion criteria were subjected to the following:**

**Full history was taking includes:** Personal, present, past: [History of symptoms of chest infection (fever, caught, Dyspnea, anosmia and Ageusia), history of contact with confirmed COVID-19 patients], family, obstetric, contraceptive and Menstrual history.

#### Complete physical examination:

General examination: **Vital signs** (Blood pressure, Temperature, Heart rate, Respiratory rate). **Signs of** (Pallor, Cyanosis, Jaundice, and Lymph node enlargement).

#### Local examination:

**Ultrasound:** To exclude any uterine and cervical anomalies. To ensure it was 1<sup>st</sup> trimester abortion.

**Study procedures and interventions:** Women who were going to be referred to the Ain Shams University Maternity Hospital for treatment of pregnancy loss during the first 13 weeks of their pregnancies were contacted and enrolled in the study. Following a search of the database at Ain Shams University Maternity Hospital, we made an effort to get in touch with all of the ladies who have used the hospital's emergency room or the pregnancy loss management programme. An examination of the COVID-19 infection was performed on each case. In order to detect IgG and IgM antibodies against COVID-19, we took 2 ml of patient fresh blood, put it immediately in the test cassette and after 15 minutes we found the test results This rapid test made by LABNOVATION TECHNOLOGIES, INC company specialized in developing, manufacturing and marketing of various Clinical Laboratory instruments and diagnostic reagents

#### The basic idea behind this examination

The (COVID-19) IgG & IgM quick test cassette is a qualitative membrane-based immunoassay for the detection of IgG & IgM antibodies to (COVID-19) in whole blood, serum, or plasma components. This immunoassay can be performed in as little as 15 minutes. This examination is divided into two parts, an IgG component and an IgM component. Anti human IgG is coated in the test cassette as part of the IgG component. Following this, the mixture migrates upward on the membrane chromatographically by capillary reaction and reacts with the anti-human IgG in the IgG test line region. As a consequence of this, a coloured line appeared in the region of the IgG test line where it applies if the specimen has IgG antibodies to (COVID-19). In a similar manner, antihuman IgM is coated in the IgM test line area, and if the specimen in question possesses IgM antibodies to (COVID-19), the conjugate specimen complex reacted with antihuman IgM. As a consequence of this, a coloured line appeared in the IgM test line region.

**Therefore,** In the specimen that had IgG antibodies, a coloured line appeared in the place was designed for the IgG test line. In the event that the specimen had IgM antibodies, a coloured line appeared in the place was designed for the IgM test line. In the event that the material didn't contain any antibodies, it was negative result by the absence of any coloured line in either of the test line regions. Presence of a colored line in the control act as procedural control, showing that the appropriate volume of specimen had been introduced and that membrane wicking had taken place.

**Outcomes:** Seroprevalence of covid-19 infection in women who had a spontaneous abortion in their first trimester.

#### Statistical analysis of data:

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 19, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test Significance was adopted at  $P < 0.05$  for interpretation of results of tests of significance.

#### Results

Case	+ve IgG	+ve IgM	+ve both	- ve
No.	59	13	10	18

Table 1: Serological finding in our cases.

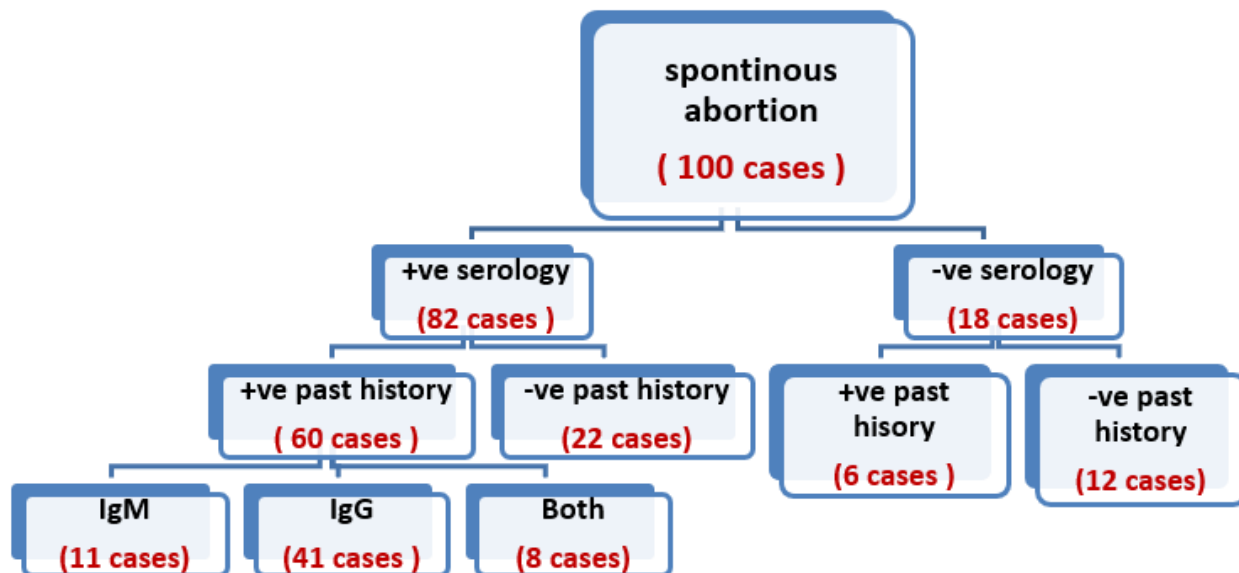


Figure 1: Relation between past history of COVID-19 and serological finding among the abortive cases.

60 cases (73%) with positive serology have past history of COVID-19 symptoms or contact with confirmed COVID-19 patient with mainly IgG antibodies. 22 cases (27%) with positive serology don't have any past history of COVID-19 symptoms or contact with confirmed COVID-19 patient.

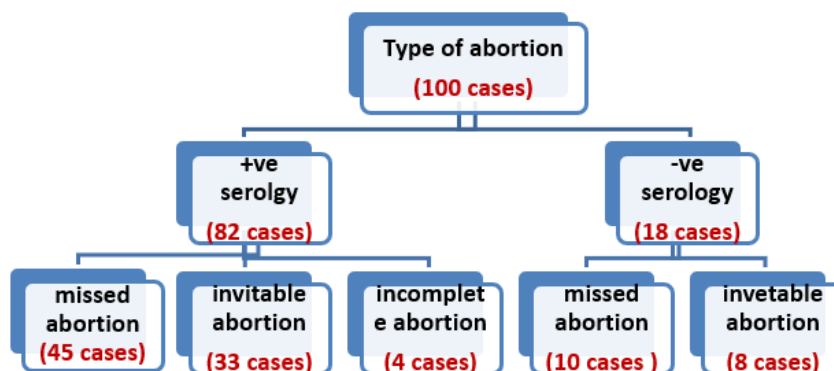


Figure 2: Types of abortion among studied cases.

Incidence of missed abortion increased with COVID-19 infectio

Table (1): Symptoms among studied cases

Symptoms among studied cases	Positive serology	Negative serology
Fever	70 (85%)	5 (27%)
Cough	50 (60%)	4 (22%)

Anosmia	40 (48%)	3 (16%)
Ageusia	50 (60%)	0 (0%)
Dyspnea	30 (36%)	1 (5%)

Most common symptoms among cases with positive serology fever, cough, anosmia, ageusia and dyspnea.

**Table (2):** Demographic data of studied cases

Age (in years)	24.5±2.7
Mean gestation (in weeks)	10.2±1.1
Occupation	
Unemployed	68 (68%)
Employed	32 (32%)

This table shows that the mean age was 24.5±2.7, Mean gestation was 10.2±1.1, 68% were unemployed.

**Table (3):** Association of work status with IgM positivity

Work status	IgM test				P value
	Positive		Negative		
	N	%	N	%	
Employed	9	28.1	23	71.9	<b>0.403</b>
Unemployed	14	79.4	54	20.6	

Table (4) shows there is no association between employment status and IgM positivity among the studied participants.

**Table (4):** Association of work status with IgG positivity

Work status	IgG test				P value
	Positive		Negative		
	N	%	N	%	
Employed	30	93.8	2	6.3	<b>0.000*</b>
Unemployed	39	57.4	29	42.6	

\*statistically significant (P<0.05)

Table (5) shows there is a significant association between employment status and IgG positivity among the studied participants (P< 0.05)

**Table (5):** Association of work status with both IgG and IgM positivity

Work status	Both				P value
	Positive		Negative		
	N	%	N	%	
Employed	7	21.9	25	78.1	<b>0.007*</b>
Unemployed	3	4.4	65	95.6	

\*Statistically significant (P<0.05)

Table (6) shows there is a significant association between employment status and both IgM & IgG positivity among the studied participants (P< 0.05)

**Table (6):** Association of symptomatology with IgG and IgM positivity

	IgG positive (n = 59)	IgM positive (n=13)	Both positive (n=10)	Negative (n=18)	P
Symptoms present	21	10	8	11	<b>&lt;0.0001</b>
Symptoms absent	38	3	2	7	

This table shows that there was a significant difference between IgG positive, IgM positive, Both positive and Negative as regard Symptoms.

**Table (7):** Correlation between Abortion and COVID -19 antibodies among the studied groups.

	Abortion	
	r	P
IgG positive	-0.020	<b>0.844</b>
IgM positive	0.275	<b>0.006*</b>
Both positive	0.127	<b>0.209</b>

\*Statistically significant (P value< 0.05)

Table (8) shows Correlation between Abortion and COVID-19 antibodies among the studied groups. There is weak significant correlation between Abortion and IgM positive

**Table (8):** ROC analysis for serum IgM levels among pregnant women in their first trimester.

Area Under the Curve							
Test Result Variable(s)	AUC	Std. Error <sup>a</sup>	Sensitivity	Specificity	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
						Lower Bound	Upper Bound
IgM	0.55	0.127	33.3	77.7	0.653	0.307	0.803

This table shows that Sensitivity of IgM was 33.3%, Specificity was 77.7%.

## Discussion

The novel severe acute respiratory syndrome coronavirus 2 (COVID-19) sickness has been given the designation coronavirus disease 2019 (COVID-19) by the World Health Organization (WHO), which has also proclaimed it to be a pandemic (*Feng et al., 2020*).

Symptoms and signs of COVID-19 during pregnancy generally appear to be like those in nonpregnant individuals as fever, cough, dyspnea, and myalgia. Some of the clinical manifestations of COVID-19 overlap with symptoms of normal pregnancy (e.g., fatigue, shortness of breath, nasal congestion, nausea/vomiting) (*Wenling et al., 2020*).

In other words, being pregnant does not increase the chances of getting COVID-19 more than nonpregnant persons; however, recent studies have shown that COVID-19 during pregnancy is associated with severe outcomes such as high rate of maternal morbidity and mortality and neonatal complications. There is also emerging evidence that the risk of having stillbirth may be higher among pregnant patients with COVID-19 (*Cheraghi et al., 2022*).

According to the findings of a comprehensive analysis of previously published reports on COVID-19, there were significantly incidence of premature birth, preeclampsia, caesarean delivery, and perinatal death (*Di Mascio et al., 2020*).

Because there are no data available on spontaneous abortions caused by COVID-19 during the first trimester of pregnancy, it is not possible to extrapolate any conclusive evidence regarding the effects of infection during the early stages of pregnancy (*Cosma et al., 2021*).

The aim of this study was to measure Seroprevalence of covid-19 infection among females with 1<sup>st</sup> trimester spontaneous abortion and association between previous COVID-19 infection and first trimester spontaneous abortion but lack of data about this new disease was a problem that affect our research. Our 100 cases with 1st trimester abortion, underwent rapid test of covid 19.

59 cases were positive IgG, 13 cases positive IgM, 10 cases positive IgG & positive IgM and 18 cases were negative.

Which means that 23% only of cases have recent covid-19 infection and this percentage does not confirm that the cause of spontaneous abortion is covid-19. And there is weak significant correlation between abortion and IgM antibodies. So, infection with COVID-19 (recent or previous) has minimal effect on first trimester pregnancy loss

*Sharma et al. (2023)* reported the of the 220 pregnant women tested for IgG and IgM, 160 were SARS-CoV-2 IgG positive, 37 (16.8%; 95% CI: 11.8–21.8%) were SARS-CoV-2 IgM positive and 27 (16.9%; 95% CI: 7.9–1.6%) were both IgG and IgM positive.

Our study shows that the incidence of COVID-19 antibodies was 82% with mainly IgG antibodies, 60 cases with positive serology have past history of

COVID-19 symptoms or contact with confirmed COVID-19 patient, 22 cases with positive serology don't have any past history of COVID-19 symptoms or contact with confirmed COVID-19 patient inspite of 1<sup>st</sup> trimester spontaneous abortion.

In this study we found that the incidence of missed abortion increases with COVID-19 infection.

The most common symptoms in cases with positive antibodies were fever (85%), cough (50%), anosmia (48%), agusia (60%) and dyspnea (36%).

This study illustrated that there was a significant difference between IgG positive, IgM positive, Both positive and negative as regard Symptoms. As we found that some cases which were symptomatic had negative serology, and vice versa.

Meaning that presence of symptoms not evidence for positive serology

*Sharma et al. (2023)* performed a cross-sectional observational study wherein pregnant women were tested for SARS-CoV-2 immunoglobulin M and immunoglobulin G levels, irrespective of their infective status or presence or symptomatology. The presence or absence of symptomatology in their first trimester is not related to IgG or IgM positivity.

Our study reported that there is a significant association between employment status and positive IgG as employed female is at higher risk of infection than unemployed female as the percentage of employed females with positive IgG is 93.8% and the percentage of unemployed females with positive IgG is 57.4%.

So we should advise pregnant employed females to be careful and take all precautions to protect themselves against infection.

This study reported that Sensitivity of IgM was 33.3%, Specificity was 77.7%.

In a study by *Sharma et al. (2023)*, positive IgG showed a cut-off value of 1.19 with a sensitivity of 99.3% and specificity of 98.3% contributing AUC with 0.995. Similarly, ROC analysis for positive IgM showed a cut-off value of 1 with a sensitivity of 97.3% and specificity of 98.9% yielding AUC with 0.993.

According to our study COVID-19 infection has very minimal effect on first trimester spontaneous abortion and first trimester of pregnancy will pass safely. Women who want get pregnant during this pandemic don't worry about your pregnancy.

It is challenging to speculate that SARS-CoV-2 would be responsible for abortions at a time when chromosomal errors in the embryo are considerably more likely to result in pregnancy loss than negative effects of the virus at the maternal-fetal interface.

## Conclusion

Our study provides reassuring findings for women who intend to become pregnant during the SARS-CoV-2 pandemic or who became infected during

their first trimester of pregnancy. COVID-19 appears to have low risk of maternal complication at the beginning of pregnancy.

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