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Original Research Article

The impact of COVID-19 outbreak and lockdown on maternal complications during pregnancy

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ABSTRACT

Background: The COVID-19 outbreak has affected pregnant women. The aim of this study was to examine the effect of COVID-19 outbreak and lockdown on maternal complications in pregnant women.

Methods: A retrospective review of pregnant patients who presented for antenatal care to the private clinic in Beirut, Lebanon before or during the COVID-19 lockdown which started in March 2020. The first group consisted of women before the lockdown between September 1, 2019 and February 29, 2020. The second group included women during or after the lockdown between March 1, 2020 and August 31, 2020.

Results: A total of 97 women were included, 48 in the before lockdown group and 49 during or after lockdown group. The percentage of epigastric pain was significantly lower in the first group (12.5% vs. 71.4% respectively, p -value<0.0001). Anemia was significantly lower in the before group (60.4% vs. 83.7%, respectively p -value=0.01). Vomiting and hypotension were significantly higher in the after group. Around 87% of women in the before group had flu-like symptoms such as muscle ache and dizziness compared to 44.9% and 46.9% in the after group (p -value<0.0001). None of the patients in the after group visited the emergency department or were hospitalized during pregnancy. Almost 43% of patients in the after group had severe anxiety compared to 14.6% in the before group (p -value=0.001).

Conclusions: Lockdown influenced maternal complications during pregnancy and resulted in anxiety for many women. Management practices regarding pregnancy and childbirth after lockdown are necessary to minimize the associated negative consequences.

Keywords: COVID-19, Lockdown, Pregnancy complications

INTRODUCTION

The coronavirus disease-2019 (COVID-19) was declared by the World Health Organization (WHO) as a public health emergency of international concern and a global pandemic.¹⁻³ This emergent outbreak has rapidly spread across the countries which have adopted different

measures to control disease transmission such as closure of public spaces, traffic and mobility restrictions, and social distancing.⁴⁻⁶ Starting March 2020, the Lebanese government has introduced drastic measures to all citizens in order to flatten the outbreak curve. While the lockdown was effective in terms of infection control; yet, studies showed that the restrictions resulted in a radical change in habits, lifestyle, and socialization.^{4,7,8} Re-

adaptation into new ways of life, behavior, and conduct has led to changes in the health of the populations.^{2,8}

The lockdown has also influenced the pregnant women who compose an important subset of the population. This includes isolation from relatives, hesitation to undergo antenatal examinations, and difficulties in obtaining maternal supplies.² Moreover, the pandemic has caused major changes of healthcare infrastructure and human resources, hence creating exceptional challenges for maternal and fetal healthcare.⁹

Several studies examined the possible risks associated with COVID-19 on the clinical and psychological characteristics of pregnant women. It was reported that the pandemic and lockdown resulted in decreased preterm birth and admission to emergency departments, in addition to increased fetal weight.^{1,10,11} They also negatively affected women's medical counseling and social support as well as increased depression and anxiety.^{2-4,8,12} All these consequences might have detrimental effect on the women and the newborn.^{12,13}

Understanding the consequences of the pandemic on maternal and fetal health will contribute to decreasing adverse events and will allow for the improvement of antenatal healthcare during subsequent waves.¹² Hence, the objective of this study was to examine the effect of COVID-19 outbreak and lockdown on maternal complications in pregnant women. The secondary objective was to examine the impact of the lockdown on fetal health.

METHODS

Study setting and population

A retrospective review of pregnant patients aged between 20 and 44 years who presented for antenatal care to the private clinic in Beirut, Lebanon before or during the COVID-19 lockdown which started in March 2020. The patients were divided into two groups. The first group consisted of women who presented before the lockdown between September 1, 2019 and February 29, 2020. The second group included women who presented during or after the lockdown between March 1, 2020 and August 31, 2020. Duplicate entries from women who visited the clinics before and during lockdown was avoided.

Exclusion criteria

Exclusion criteria were pregnant women with history of systemic disorder; women who consumed anxiolytic drugs before pregnancy and those with severe anemia (Hct 28 pre-pregnancy).

Data collection

Data collection was comprised of three sections. The first section consisted of demographic characteristics such as

age, education, employment, economic status, and weight during the first and last trimesters. The second section was about the obstetric characteristics and complications. This included frequency of visiting the obstetrician, hematocrit levels, maternal and fetal complications during pregnancy, anxiety, visiting the emergency department (ED) and hospitalization. The third section was about the women's delivery and neonatal characteristics such as delivery mode, indications for cesarean section, neonatal weight and NICU admission.

Statistical analysis

The Statistical Package for Social Sciences (SPSS version 24) was used for analysis. Categorical variables were compared using the Chi square test or Fisher's exact and was presented as number and percent. Continuous variables were compared using the t-test and were presented as mean \pm standard deviation. A p-value <0.05 indicated statistical significance.

RESULTS

A total of 97 women were included in the study, 48 women were in the before lockdown group and 49 women were in the during or after lockdown group. The socio-demographic characteristics are presented in Table 1. The mean age was similar between the two groups (27.98 \pm 2.45 vs. 28.92 \pm 5.19 years for the before and after groups respectively). The mean weight change between the first and last trimesters was also similar between the two groups. Around 48% of the women in the before group had university education compared to 34.7% in the second group. The majority of women resided in urban regions, had middle economic status and were unemployed (Table 1).

Regarding the obstetric characteristics, about 98% of the women visited the obstetrician for antenatal care every month and 2% had visits every 20 days. The mean hematocrit level decreased from 34.56 \pm 1.29 during the first trimester to 33.22 \pm 1.78 during the second or third in the before group while it decreased from 35.18 \pm 1.25 to 34.69 \pm 1.62 in the after group. As for complications during pregnancy, the percentage of epigastric pain was significantly lower in the first group (12.5% vs. 71.4% respectively, p-value<0.0001). Anemia was also significantly lower in the before group (60.4% vs. 83.7%, respectively p-value=0.01). Moreover, the percentage of women who had constipation and UTI was significantly less in the before group. On the other hand, vomiting and hypotension were significantly higher in the after group. Around 87% of women in the before group had flu-like symptoms such as muscle ache and dizziness compared to 44.9% and 46.9% in the after group (p-value<0.0001) while about 85% had dyspnea and nasal discharge in comparison to 0% and 46.9% in the after group (p-value<0.0001). Furthermore, 26.8% had fetal complications during pregnancy in the before group compared to 2.2% in the after group (p-value=0.001).

None of the patients in after group visited the emergency department during pregnancy while 35.4% of patients in the before group visited the ED (p-value<0.0001). Most of the women visited the ED due to experiencing contractions. Similarly, none of the women were

hospitalized in the after group compared to 14.6% in the before group (p-value=0.006). Almost 43% of patients in the after group had severe anxiety compared to 14.6% in the before group (p-value=0.001) (Table 2).

Table 1: Women's socio-demographic characteristics.

		Before lockdown (n=48)	During or after lockdown (n=49)	p-value
Age (years)	Mean±SD	27.98±5.81	28.92±5.19	0.40
Trimester	First	7 (14.6%)	4 (8.2%)	0.003
	Third	0 (0.0%)	2 (4.1%)	
	First and second	0 (0.0%)	6 (12.2%)	
	Second and third	0 (0.0%)	6 (12.2%)	
	First, second and third	41 (85.4%)	31 (63.3%)	
Gravida	1	15 (31.3%)	13 (26.5%)	0.90
	2	12 (25.0%)	15 (30.6%)	
	3	6 (12.5%)	7 (14.3%)	
	≥4	15 (31.3%)	14 (28.6%)	
Weight first (kg)	Mean±SD	64.11±9.09	64.47±9.13	0.85
Weight last (kg)	Mean±SD	78.76±9.69	78.96±7.74	0.92
Weight change (kg)	Mean±SD	14.90±5.88	14.50±4.95	0.73
Education	Middle School	5 (10.4%)	7 (14.3%)	0.41
	High school	20 (41.7%)	25 (51.0%)	
	University	23 (47.9%)	17 (34.7%)	
Residency	Urban	35 (72.9%)	36 (73.5%)	0.95
	Rural	13 (27.1%)	13 (26.5%)	
Economic status	Low	6 (12.5%)	12 (24.5%)	0.21
	Middle	33 (68.8%)	32 (65.3%)	
	High	9 (18.8%)	5 (10.2%)	
Employment	No	34 (70.8%)	31 (63.3%)	0.43
	Yes	14 (29.2%)	18 (36.7%)	

Table 2: Women's obstetric characteristics and complications.

		Before lockdown (n=48)	During or after lockdown (n=49)	p-value
Visit obstetrician for antenatal care	Every month	47 (97.9%)	48 (98.0%)	1.00
	Every 20 days	1 (2.1%)	1 (2.0%)	
Hematocrit first	Mean±sd	34.56±1.29	35.18±1.25	0.02
Hematocrit last	Mean±sd	33.22±1.78	34.69±1.62	<0.0001
Complications during pregnancy	Premature labor	2 (4.2%)	3 (6.1%)	1.00
	Diabetes	2 (4.2%)	4 (8.2%)	0.68
	Epigastric pain	6 (12.5%)	35 (71.4%)	<0.0001
	Pneumonia	2 (4.2%)	3 (6.1%)	1.00
	Bleeding	6 (12.5%)	11 (22.4%)	0.29
	Vomiting	41 (85.4%)	30 (61.2%)	0.007
	Anemia	29 (60.4%)	41 (83.7%)	0.01
	Constipation	21 (43.8%)	44 (89.38%)	<0.0001
	UTI	15 (31.3%)	34 (69.4%)	<0.0001
	Hypertension	3 (6.3%)	8 (16.3%)	0.12
	Hypotension	32 (66.7%)	0 (0.0%)	<0.0001
	Hypoglycemia	0 (0.0%)	2 (4.1%)	0.49
Flu-like symptoms during pregnancy	Fever	3 (6.3%)	2 (4.1%)	0.68
	Headache	42 (87.5%)	47 (95.9%)	0.13
	Muscle ache	42 (87.5%)	24 (49.0%)	<0.0001
	Cough	43 (89.6%)	22 (44.9%)	<0.0001

Continued.

		Before lockdown (n=48)	During or after lockdown (n=49)	p-value
	Dyspnea	41 (85.4%)	0 (0.0%)	<0.0001
	Dizziness	42 (87.5%)	26 (53.1%)	<0.0001
	Nasal discharge	41 (85.4%)	23 (46.9%)	<0.0001
Fetal complications during pregnancy		11 (26.8%)	1 (2.2%)	0.001
Visit emergency department during pregnancy	No	31 (64.6%)	49 (100.0%)	<0.0001
	Once	11 (22.9%)	0 (0.0%)	
	Twice	4 (8.3%)	0 (0.0%)	
	Thrice	2 (4.2%)	0 (0.0%)	
Reason for visiting ED	Contractions	4 (23.5%)	0 (0.0%)	-
	Contractions and bleeding	4 (23.5%)	0 (0.0%)	
	Contractions and UTI	4 (23.5%)	0 (0.0%)	
	Hypotension	1 (5.9%)	0 (0.0%)	
	Pneumonia	1 (5.9%)	0 (0.0%)	
	Decrease fetal movement	1 (5.9%)	0 (0.0%)	
	Vomiting	2 (11.8%)	0 (0.0%)	
Hospitalized during pregnancy	No	41 (85.4%)	49 (100.0%)	0.006
	Yes	7 (14.6%)	0 (0.0%)	
Reason for hospitalization	Preterm labor	4 (57.1%)	0 (0.0%)	-
	UTI	2 (28.6%)	0 (0.0%)	
	Vomiting	1 (14.3%)	0 (0.0%)	
Anxiety	No	10 (20.8%)	16 (32.7%)	0.001
	Mild	27 (56.3%)	10 (20.4%)	
	Moderate	4 (8.3%)	2 (4.1%)	
	Severe	7 (14.6%)	21 (42.9%)	

Table 3: Women's delivery and neonatal characteristics.

		Before lockdown (n=48)	During or after lockdown (n=49)	p-value
Delivery mode	NVD	15 (31.3%)	17 (34.7%)	0.39
	CS	26 (54.2%)	29 (59.2%)	
	Abortion in first trimester	7 (14.6%)	3 (6.1%)	
CS indication	Breech	1 (3.8%)	0 (0.0%)	0.78
	Disproportion	7 (26.9%)	10 (34.5%)	
	Fetal distress	2 (7.7%)	2 (6.9%)	
	Fever	1 (3.8%)	0 (0.0%)	
	Malformation	0 (0.0%)	1 (3.4%)	
	PROM	1 (3.8%)	1 (3.4%)	
	Repeat CS	12 (46.2%)	13 (44.8%)	
	Twins	2 (7.7%)	1 (3.4%)	
	Preeclampsia	0 (0.0%)	1 (3.4%)	
Neonatal weight	Grams	3231.71±0.71	3165.22±367.10	0.43
NICU admission	No	25 (61.0%)	39 (84.8%)	0.01
	Yes	16 (39.0%)	7 (15.2%)	

More than 50% of the women delivered by cesarean section and 14.6% of women in the before group had abortion in the first trimester due to congenital anomaly (acrania, cystic hygroma, hydrocephalus, down syndrome) compared to 6.1% in the after group. Of those who had CS, the indication was repeat CS for 44.8% of

the women (Table 3). The mean neonatal weight was similar between the two groups. The percentage of those who required NICU admission was significantly higher in the before group (39.0% vs. 15.2% respectively, p-value=0.01) (Table 3).

DISCUSSION

Being a vulnerable group, pregnant women's health has raised a concern worldwide after the COVID-19 pandemic which imposed changes that influenced pregnancy and newborn management. Several studies on COVID-19 and pregnancy have been published recently, but only few have evaluated the repercussion of the outbreak on the pregnancy course. The present study showed that the lockdown due the COVID-19 pandemic had an impact on maternal complications during pregnancy. Some complications such as anemia, constipation, urinary tract infection and anxiety increased during the confinement period. However, other complications such as flu-like symptoms, fetal complications, ED visit and hospitalization decreased during the lockdown period.

Some studies reported the impact of COVID-19 pandemic and lockdown on the physical and mental health of pregnant women.¹⁻⁵ The lifestyle and economic alterations during this outbreak had caused changes in the prevalence of some maternal complications.

In our study, we reported a significant decrease in hematocrit level in the confined pregnant women compared to the period before the lockdown. In addition, they were more prone to gastrointestinal complications especially epigastric pain, constipation, and urinary tract infections. Zhang et al have described 'emotional eating' in pregnant women during the lockdown period as an eating behavior as a consequence to a stressful situation such as natural disasters and pandemics.⁵ This condition has an impact on pregnant women and might be at the origin of the increased incidence of epigastric pain and constipation in the confined pregnant women. Furthermore, anxiety and stress felt by the pregnant patient might have driven her for an unhealthy diet. This latter might cause dehydration, malnutrition, and nutritional imbalance that could explain why confined pregnant women are at increased risk for anemia, gastrointestinal upset and urinary tract infections. Besides, exercise is one of the most effective ways to regulate mood. If adopted during confinement, stress and anxiety will both decline; hence, abatement of the emotional eating and reduction in complications.⁵

On the other hand, the current study revealed that the prevalence of several complications decreased as a result of the lockdown. Flu-like symptoms, more specifically muscle aches, cough, dyspnea, dizziness, and nasal discharges, had significantly decreased during confinement. In fact, lockdown afforded pregnant women the opportunity to optimize preventive approach; thus, reducing the chance of common viral infections during pregnancy despite the vulnerability of pregnant patient to several respiratory infections. Focusing on hygiene, decreased social interaction, and working remotely are all behavioral modifications followed by pregnant women during the lockdown period as declared by Philip et al.¹⁰

We found a drastic decrease in the emergency department visits during the pandemic where no restrictions were imposed on the patient's basic right to seek medical attention in the emergency department for urgent health problems. Similar findings were reported in Italy by Grandi et al.¹¹ Moreover, there was a decrease in hospitalization rate compared to pre-lockdown period. This was also seen in India where Kumari et al mentioned a reduction in hospitalization by 43% in their country during the lockdown.⁹ This suggests that a great number of the pregnant patients coming to the ED before lockdown have 'non-urgent' problems that could have potentially been addressed in an outpatient setting. On the other hand, many patients might be avoiding hospital visits and admissions and prefer treatment on an outpatient setting, minimizing by that the risk of COVID-19 infection.¹¹

Surprisingly, in our study, fetal complications and NICU admission were found to be significantly higher before the lockdown. We also did not note any significant change in the cesarean rate. In contrary, Kumari et al showed that the rate of CS was significantly lower during the pre-lockdown period.⁹ There were no preterm births in our study. Hedermann et al and Philip et al described a significant decrease in preterm birth during the lockdown period.^{10,14} Mappa et al and Nwafor et al who considered that higher rates of adverse birth outcomes such as low birth weight, increased cesarean rate and preterm deliveries, low birth weight, low Apgar score and increase NICU admission during the lockdown period were related to prenatal anxiety and domestic violence.^{3,4} According to Ravaldi et al lockdown has triggered socio-environmental and behavioral modifications which were hypothesized as an explanation for preterm birth to fall.⁶ Air pollution reduction due to government and traffic restrictions could have reduced preterm delivery as sulphur dioxide is the largest contributor to increase preterm birth.⁶ Changes in work practices due to COVID-19 lockdown might have added benefits of reducing prematurity and miscarriage rate.⁶ In our study, we attribute the decrease in NICU admission to the exaggeration in NICU admission criteria and low threshold in our institutions before the lockdown.

COVID-19 has resulted in significant psychological impact on the mental health of women during pregnancy. This was evoked by Mappa et al and Stampini et al who also found higher score of anxiety which might affect quality of life.^{3,8} This pandemic has led to heightened levels of stress in the pregnant population. The response of this stress is elicited by anxiety. The latter is the result of isolation, economic difficulties, fear of being infected, in addition to worries about fetal structural anomaly, growth restriction and preterm delivery.^{3,8,15} In fact, Nwafor et al confirmed that about 10% of pregnant women suffer from mental disorders such as anxiety in normal times.⁴ This might be aggravated during COVID-19 due to restricted access to mental health source.⁴

Therefore, a screening for perinatal anxiety should be considered due to the high prevalence of this disorder.

This study had several limitations. First, the sample size was limited. Hence, a larger group is needed to be able to generalize the outcomes to other populations. Furthermore, the data were collected from only a private clinic in Beirut and not multi-centered. In addition, the lockdown measurements were not strictly and equally followed by all the municipalities in Lebanon and we cannot guarantee that the selected pregnant women have respected the social distancing rules, which might bias the results. On the other hand, the comparative period may not be exactly optimal for seasonal influences of respiratory illnesses. Anxiety was not measured according to a validated anxiety scale. Based on this methodology, we cannot objectively and scientifically estimate anxiety level in our sample.

CONCLUSION

In conclusion, the COVID-19 outbreak and lockdown had an impact on maternal complications during pregnancy and resulted in anxiety for many women. Management practices regarding pregnancy and childbirth after lockdown are necessary to minimize the associated negative consequences.

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