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Original Research Article

Investigation of clinical parameters associated with COVID-19 in pregnant women

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ABSTRACT

Background: Pregnancy is an immune-compromised condition; encompass physiological changes that make the women more vulnerable to infections such as COVID-19. The major concern is about the intrauterine transmission resulting in fetal and neonatal outcomes; therefore, this group of population requires more attention pertaining prevention, management and treatment. Thus, the main aim of the study is to analyze clinical characteristics among pregnant women.
Methods: The study was conducted on 17092 samples of pregnant adults whose nasopharyngeal and/or oropharyngeal swab samples were received from various districts of Punjab (Amritsar, Gurdaspur, Hoshiarpur, Kapurthala, Tarn Taran and Pathankot) from the period of March 2020 to December 2020. Confirmation of SAS-CoV-2 was done by RT-PCR.
Results: Out of total samples (17092), 374 (2.19%) females exhibited positive results for SARS-CoV-2, and mean age of the pregnant females was 26.37 years. Analysis was performed on 210 (Positive) samples as cases and 210 age matched control females (SARS-CoV-2 negative). Analysis performed demonstrated that SpO_2 <96% and co-morbidities such as diabetes and hypertension showed significant association and are common factors in COVID-19. None of the case showed any neonatal and maternal demise.
Conclusions: In the present study, saturation level of oxygen (<96%), diabetes and hypertension was found to be significant. All the pregnant women have similar symptoms as that of non pregnant adults.

Keywords: Pregnancy, Diabetes, Hypertension, Pregnant females, SpO_2, SARS-CoV-2

INTRODUCTION

Pregnancy is a state of partial immune suppression making the pregnant women susceptible to viral infections and higher morbidity even during seasonal influenza. Maternal pneumonia is associated with several adverse obstetrical outcomes, including preterm labour, premature rupture of membranes and intrauterine growth restriction and neonatal death.[1] Therefore, it was suggested that COVID-19 pandemic may have grave repercussions in cases of pregnant women.[2] Although, World Health Organization (WHO) stated, no evidence favors that pregnant females are more vulnerable to COVID-19 symptoms as compared to common people.[3] Also, various studies reported that complications and demise due to COVID-19 amid pregnant females are fewer than those result from SARS and MERS infections.[4,5] There is no conclusive data pertaining complications, symptoms and risk factors for pregnant mothers in India, one of the countries with highest

prevalence of COVID-19. Thus, a retrospective study was conducted to analyze clinical characteristics of all pregnant women with confirmed or clinically diagnosed COVID-19 infection from the region of Punjab.

Objectives

An objective of current study was to analyze association between clinical features and COVID-19 in pregnant women.

METHODS

A retrospective study was conducted on 17092 samples of pregnant adults whose nasopharyngeal and/or oropharyngeal swab samples were received from various districts of Punjab (Amritsar, Gurdaspur, Hoshiarpur, Kapurthala, Tarn Taran and Pathankot) from the period of March 2020 to December 2020. Before commencement of the study, All samples included in this study were tested by RT-PCR for the presence of SARS-Cov-2 genes as recommended by WHO. RT-PCR reports were generated based on amplification of E gene, N gene and RdRp gene. At the time of sample receiving, after obtaining informed consent, demographic features and clinical history of the patient was recorded on a pre designed questionnaire.[6] All the analyses were performed using SPSS software (Statistical Package for the Social Sciences Inc. 20, Chicago, IL, USA). The power of study (cases and control n=210) was calculated using CaTS power calculator.

Inclusion criteria

Inclusion criteria for current study were; SARS-CoV-2 positive pregnant women with co-morbidities as subjects and SARS-CoV-2 negative pregnant women with co-morbidities as controls.

Exclusion criteria

Exclusion criteria for current study were; SARS-CoV-2 positive pregnant women without any co-morbidities, non-pregnant women with/without any co-morbidities and SARS-CoV-2 negative pregnant women without any co-morbidities.

RESULTS

A total of 17092 samples of pregnant women were received from various districts of Punjab (Amritsar, Gurdaspur, Hoshiarpur, Kapurthala, Tarn Taran and Pathankot) at Viral Research and Diagnostic Laboratory, Government Medical College, Amritsar, from the period of March 2020 to December 2020. Out of 17092, 374 (2.19%) females exhibited positive results for SARS-CoV-2, however, only four cases were found to be symptomatic which entails breathlessness, fever and cough as major symptoms. Overall, mean age of the pregnant females who were positive for SARS-CoV-2 was 26.37 years (Table 1). Out of 374 positive pregnant females, statistical analysis was performed on 210 women as cases and 210 age matched pregnant females (SARS-CoV-2 negative) were enrolled as controls for case-control study.

Table 1: Total number of SARS-CoV-2 positive cases among pregnant women.

Total	Positive N (%)	Negative N (%)	Mean age
17092	374 (2.19)	16718 (97.81)	26.37

Mean age of control females was 26.24 years. It was observed that SpO_2 <96% an important factor in COVID-19, posses significant (p=0.000) risk in pregnant women as 18.1% of case females had <96% oxygen saturation level as compared to 4.76% control women. Also, the status of other co-morbidities such as diabetes and hypertension were also recorded and significant (p<0.000) association was noticed (Table 2). None of the case showed any neonatal and maternal demise. Overall analysis of samples received showed that utmost cases of COVID-19 in pregnant women were noticed in July and August. A skyrocketing rise in cases was observed from the month of May to August and after that sudden plummation was seen till November (Figure 1).

DISCUSSION

Pregnancy is defined as a physiological state that predisposes the women to viral infection. In addition to the affect of COVID-19 infection on a pregnant woman, there are concerns about the potential effect on fetus and neonatal consequences; therefore, pregnant women constitute a group that requires special attention in relation to prevention, diagnosis and management.[7] It has been reported that complications in pregnant mothers from COVID-19 infection are similar to those present in non-pregnant adults.[8] Few studies observed that respiratory disorders entailing radiological findings of patchy pulmonary infiltrate, ground glass opacities and consolidation in pregnant women has been non-life-threatening.[9] While a report from New York City revealed the infection status of 2 pregnant women who developed medical complications after delivery and were admitted for intensive care, however, their infants were negative for the virus.[10]

In our study, mean age of pregnant females were 26.37 years, which is similar to the age observed in the investigation by Sattari et al and Chen et al.[11,12] Various studies recorded that women with COVID-19 were more prone to underlying co-morbidities such as diabetes, hypertension and cardiovascular diseases. Thus, present study also observed that about 21.9% of case women had gestational diabetes and 27.6% had hypertensive disorder at the time of pregnancy while only 4.29% of control females had diabetes and 9.52% had hypertension. The difference was found to be significant (p<0.000) for both

co-morbidities indicating these are paramount factors that are more common amid SARS-CoV-2 positive pregnant females and might leads to acquiring infections and increased risk of developing pregnancy complications.

Table 2: Levels of various parameters investigated in pregnant and non pregnant women.

Parameters		Cases (N=210) Frequency (%)	Controls (N=210) Frequency (%)	P value
Hb	<10	11 (5.24)	10 (4.76)	0.82
	≥10	199 (94.76)	200 (95.24)	
Platelets	≤2,00,000	6 (2.86)	5 (2.38)	0.76
	>2,00,000	204 (97.14)	205 (97.62)	
CRP	≥10	8 (3.81)	2 (0.95)	0.07
	<10	202 (96.19)	208 (99.04)	
RBCs	<4,00,000	5 (2.38)	3 (1.42)	0.48
	≥4,00,000	205 (97.62)	207 (98.57)	
Folic Acid	Yes	196 (93.33)	201 (95.74)	0.29
	No	14 (6.67)	9 (4.29)	
SGOT	≥48	22 (10.48)	18 (8.57)	0.51
	<48	188 (89.52)	192 (91.43)	
SGPT	≥60	21 (10.0)	25 (11.90)	0.53
	<60	189 (90.0)	185 (88.09)	
TLC	<11,000	200 (95.24)	206 (98.09)	0.11
	≥11,000	10 (4.76)	4 (1.90)	
Creatinine	≥1	17 (8.09)	13 (6.19)	0.44
	<1	193 (91.90)	197 (93.81)	
SpO_2	<96%	38 (18.1)	10 (4.76)	0.000
	≥96%	172 (81.9)	200 (95.2)	
Diabetes	Yes	46 (21.9)	9 (4.29)	0.000
	No	164 (78.1)	201 (95.7)	
Hypertension	Yes	58 (27.6)	20 (9.52)	0.000
	No	152 (72.4)	190 (90.5)	

This study was consistent to the report by Martinez-Portilla and co-workers who observed that diabetes and hypertension was significantly associated with mortality in pregnant women.[13]

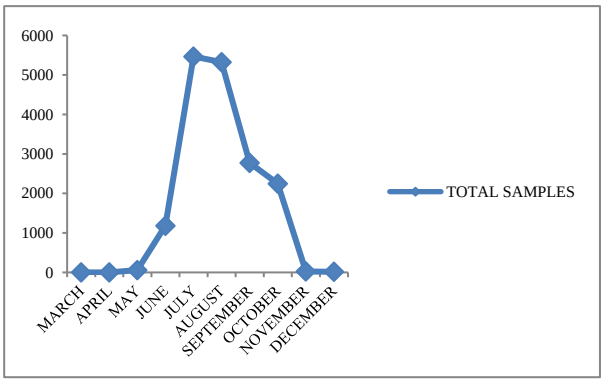

Figure 1: Monthly trend of SARS-CoV-2 among pregnant women.

A meta-analysis performed on case-control approach indicated that history of diabetes was more common among pregnant women rather than non-pregnant.[14] Jordan et al reported that diabetes and hypertension are common risk factors for pregnant women infected with COVID-19.[15] A report from CDC also showed diabetes is a frequently occurring factor in pregnant adults with COVID-19.[16] Various other studies observed 7% and 12% gestational diabetes among pregnant adults while reports from China, Italy and France demonstrated that above risk factors were not common in pregnant women.[17-20] In the present study, among various parameters evaluated in pregnant adults, saturation level of oxygen was found to be significant (p=0.000). Very few studies reported the saturation level of oxygen in pregnant females with COVID-19; however, a recent study noticed oxygen saturation percentage was 91.62±7.58 and saturation level showed reduction with severity of the disease.[11] Wang et al reported a case of a pregnant mother who admitted to the hospital in emergency but the oxygen saturation levels was 97%.[21] In terms of clinical manifestations, the common symptoms of the pregnant women at the onset of COVID-19 were fever and cough, and the less common symptoms were diarrhea and shortness of breath. Present study reported that breathlessness, fever and cough as major symptoms amid pregnant women. Similar results were also showed by recent study.[11,12,22-24] Another study observed that laboratory tests confirmed that absolute lymphocyte counts were reduced, C-reactive protein, erythrocyte sedimentation rate, and D-dimer were increased, and

leucocytes were normal in most of the seven pregnant patients.[11] Studies by Chen et al and Yang et al indicated higher CRP levels and lymphopenia amid pregnant adults.[7,12] Our study showed contrast findings, confirming that pregnant females with COVID-19 had normal test results as those pregnant females without COVID-19. Also, death of pregnant mother and child was not observed, which might be owing to the fact that pregnant women are more likely to get attention after contracting disease with lesser delay in treatment.

Limitations

This investigation being retrospective study, therefore, some considerations should be taken into account while interpreting the findings. Firstly, the impact of COVID-19 infection on the fetus in during pregnancy remains to be clarified. Secondly, whether vaginal delivery mushrooms the risk of mother-to-child vertical transmission needs to be further investigated. Further, in advance times whether COVID-19 could damage the placenta, which is a significant link in vertical transmission, also needs to be inspected. For future investigations, these issues and follow-up studies of pregnant women with COVID-19 infection, as well as neonates, should be taken into consideration which will be essential to ascertain the safety and health of mothers and babies exposed to SARS-CoV-2.

CONCLUSION

Owing to immune-compromised status and physiological changes during pregnancy, pregnant women could be more vulnerable to COVID-19 infection as compared to general population. Although, similar symptoms among pregnant and non pregnant women were seen, however, there is always a possibility of intrauterine transmission that may leads to complications for unborn such as still birth, miscarriage, preterm delivery and fetal distress. As per spread, maternal management and fetal safety has become a major concern, but there is meagre information of evaluation and administration of pregnant women infected with COVID-19, and the potential risk of vertical transmission is unclear. Thus, understanding symptoms and clinical findings can aid in diagnosis, treatment and recuperate the prognosis in mother and fetus. Also, clinical recommendations to manage COVID-19 infection in pregnant females should be based on the data drawn from large scale studies rather than limited experiences from earlier outbreaks.

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