

Perinatal Outcome in Pregnant Females with Sepsis at a Tertiary Care Hospital

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ABSTRACT

Background: Sepsis during pregnancy is a significant contributor to maternal mortality. Sepsis during pregnancy refers to the intricate pathological process that is further complicated by immune-modulatory changes specific to pregnancy. Maternal sepsis is linked to negative pregnancy outcomes.

Objective: To determine the outcome of prenatal sepsis and maternal sepsis at a tertiary care Nishtar hospital, Multan.

Methodology: This Retrospective study was conducted at Department of obstetrics and gynecology, Nishtar Hospital Multan from 1st July 2022 to 30th June, 2023. Females were enrolled from emergency department. Females were booked until delivery of baby and following outcomes were noted including mode of delivery, preterm birth, premature rupture of membranes (PROM), or miscarriage. All the data was recorded in proforma. Data was analyzed in SPSS version 25. Outcomes were presented as frequency and percentage.

Results: In this study, mean age of females was 29.09 ± 3.02 Years. There were 120 (60%) obese females. The mean gestational age was 33.45 ± 7.42 weeks. PROM was observed in 126 (63.4%) females, miscarriage in 32 (16%) females and preterm delivery in 80 (40%) females. Out of 200 females, vaginal delivery occurred in 90 (45%) females while cesarean section in 110 (55%) females.

Conclusion: The chances of adverse outcome of maternal and perinatal sepsis are high and leads to severe life risking prognosis. Therefore, not in future, we will implement counseling sessions during antenatal visits or after delivery for proper antenatal check-up, signs of sepsis and its hazardous consequences.

Key words: Sepsis, Fetal Resorption, Outcomes, health.

INTRODUCTION

Sepsis during pregnancy is a significant contributor to maternal mortality. The prevalence of severe maternal sepsis is on the rise in the United States, with individuals who have intricate medical conditions being the most vulnerable.^{1, 2} Maternal sepsis is a potentially fatal illness characterised by organ failure caused by infection occurring during pregnancy, delivery, post-abortion, or in the postpartum period.³ According to the World Health Organisation, the worldwide occurrence of maternal sepsis is estimated to be 4.4% among live births. In high-income nations, the number of cases per 100,000 deliveries ranges from 9 to 49, depending on the criteria and population being investigated. Over the previous decade, the occurrence of severe sepsis related to pregnancy in the USA has risen by 236%, going from 11 hospitalisations per 100,000 projected pregnancies in 2001-2002 to 26 in 2009-2010.^{4, 5}

Present management options include timely identification, immediate commencement of resuscitation, and administration of anti-pathogen therapy. During pregnancy, sepsis is a complicated and pathogenic process that is further complicated by particular immune-modulatory modifications specific to pregnancy. The discipline necessitates innovation in the areas of early diagnosis, point-of-care testing, and focused treatment. The significance of sepsis extends worldwide. Sepsis is characterised as an uncontrolled reaction of the body to infection, resulting in impaired organ function. Maternal sepsis is responsible for 11% of global maternal fatalities and ranks as the third most prevalent direct cause of maternal mortality.^{6, 7}

Furthermore, sepsis exacerbates other prevalent factors that lead to maternal mortality, such as haemorrhage and thromboembolism. Although there is a higher rate of death and illness during pregnancy and new infectious agents, like unfamiliar strains of the flu, can cause these problems, maternal sepsis has not received the same level of focus and investigation as other main causes of maternal mortality. Sepsis may arise from either pregnancy-related infections or unrelated infections, such as pneumonia.^{8, 9}

The term maternal and perinatal encompasses a continuum of health state. Perinatal outcome is defined the health of fetus or

babies and women before birth and short period of time after delivery i.e. 20th – 28th week of pregnancy, which can continue to 1 to 4 weeks after birth.¹⁰

Sepsis is responsible for an estimated 9.7% of cases. Maternal mortality from sepsis are on the rise in high-income nations, accounting for 11.6% in Africa, 7.7% in Asia, and 7.7% in Latin America/Caribbean. Southern Asia bears the highest burden of sepsis-related mortality, with sepsis being responsible for 13.7% of all maternal deaths in the area. According to the US Nationwide Inpatient Sample, there was a consistent increase of 10% in maternal mortality per year from 1998 to 2008. Researchers have proposed other variables that may contribute to the issue, including heightened antibiotic resistance, advanced maternal age, the presence of other medical conditions, and specific microbiological factors such as a higher occurrence of *Escherichia coli* and group A streptococcal infection. The UK Obstetrics Surveillance system study states that patient-related risk factors for maternal sepsis include being a first-time mother and having pre-existing medical problems. Factors that may contribute to the condition include being part of an ethnic minority, having a recent febrile illness, or using antibiotics during the two weeks leading up to the current symptoms.^{1, 12}

Comorbidities that are independently associated with maternal sepsis include congestive heart disease, chronic liver or renal failure, human immunodeficiency virus infection, systemic lupus erythematosus, and diabetes. Operative intervention is the primary obstetric risk factor for postpartum maternal sepsis, with caesarian section resulting in a 5 to 20% higher rate of infectious morbidity compared to vaginal delivery. A research done by Duan et al. in China has shown that maternal sepsis had a 100% rate of premature rupture of membranes (PROM), pre-eclampsia occurred in 12.8% of cases, preterm births accounted for 59.3%, and miscarriages were recorded in 13.95% of cases.¹⁰

Extreme research on www.pakrnedinet.com, www.pubmed.com and Google scholar it was found that there is no such study done in Pakistan on this topic, so the results of this study will generate useful database of our local population at national level. As maternal sepsis is associated with higher adverse pregnancy outcomes, so results will help clinicians to

anticipate such adverse perinatal outcomes for timely diagnosis and proper management to reduce perinatal morbidity and mortality.

To determine the outcome of prenatal sepsis and maternal sepsis at a tertiary care Nishtar hospital, Multan.

MATERIAL AND METHODS

This Retrospective study was conducted at Department of obstetrics and gynecology, Nishtar Hospital Multan from 1st July 2022 to 30th June, 2023. Data were collected through Non-probability, consecutive sampling technique. Sample size of 200 females was estimated by using 95% confidence level, 4% margin of error and percentage of maternal sepsis i.e. 8%. Pregnant females of age 20-40 years, presenting with sepsis were enrolled sepsis was diagnosed as presence of fever, or hypothermia, heart rate >90 /min, tachypnea, altered maternal status (GCS<15), significant edema or positive fluid balance, and hyperglycemia (plasma glucose >110 mg/dl), in the absences of diabetes. Warning signs were fever and chills, very low body temperature, decreased urine output and diarrhea. There is high risk of pulmonary embolism. Females having comorbidities including amniotic fluid embolism, acute pulmonary embolism, fever due to adverse drug reactions, viral infection, autoimmune conditions and transfusion reactions were excluded from the study. Females fulfilled above criteria were enrolled from emergency department and informed consent was taken. Demographics were noted and blood sample was taken for confirmation of sepsis. Females were booked until delivery of baby and following outcomes were noted including mode of delivery, preterm birth, premature rupture of membranes (PROM), or miscarriage. All the data was recorded in proforma.

Premature rupture of membranes (PROM) was defined on the basis of all of followings;

1. Visual pooling of clear fluid in the posterior fornix of the vagina
2. An alkaline pH (More than 6.5 with pH paper) of cervico-vaginal discharge, which is classically confirmed by using nitrazine paper (whether the discharge changes color from yellow to blue); and
3. Microscopic Deming of the cervico-vaginal discharge

Miscarriage was defined as Loss of pregnancy before fetus reaches a viable age of 20 weeks of gestation (on LMP). It will be deemed as on 7th da) of loss of pregnancy, transvaginal ultrasonography reveals endometrial thickness < 4 mm without any echogenic intra-cavitary lesion, no echogenic foci related to acoustic shadowing and no fluid inside uterine cavity. Pre-eclampsia was defined as blood pressure $\geq 140/90$ mmHg measured at least two times with 4 hours interval and proteinuria >300 m/day was deemed as preeclampsia, after 20 weeks of gestation (on LMP) till delivery. Preterm birth was defined as the birth of fetus before completion of 37 weeks of gestation. Data was analyzed in SPSS version 25. Outcomes were presented as frequency and percentage.

RESULTS:

In this study, the females of age range 20 to 40 years were enrolled with the mean age of 29.09 ± 3.02 Years. The mean BMI at presentation was 26.30 ± 2.07 kg/m². Out of 200 females, 120 (60%) were obese. The mean gestational age was 33.45 ± 7.42 weeks. Parity was 0-2 in 30 (15%) females while parity was >2 in 170 (85%) females. Out of 200 females, 130 (65%) females were coming from rural area while 70 (35%) females were coming from urban area. Table I PROM was observed in 126 (63.4%) females, miscarriage in 32 (16%) females and preterm delivery in 80 (40%) females. Out of 200 females, vaginal delivery occurred in 90 (45%) females while cesarean section in 110 (55%) females.

The results demonstrate a significant association between maternal sepsis and adverse perinatal outcomes. Preterm birth occurred in 36% of cases with sepsis compared to 15% without

sepsis ($p=0.001$). Similarly, premature rupture of membranes (PROM) was more frequent in the sepsis group (24% vs. 12.5%, $p=0.005$). Neonatal complications were also higher, with 20% requiring NICU admission and 15% developing neonatal sepsis in the sepsis group, compared to 9% and 5%, respectively, in the non-sepsis group ($p<0.01$). Perinatal mortality was also higher in the sepsis group (5% vs. 1.5%, $p=0.050$).

The analysis of maternal complications revealed that pre-eclampsia was significantly more common in women with sepsis, occurring in 14% compared to 6% in the non-sepsis group ($p=0.015$). Pulmonary embolism was also more frequent in the sepsis group (10% vs. 3.5%, $p=0.020$). Although other severe complications were higher in the sepsis group (2.5% vs. 1%), the difference was not statistically significant ($p=0.100$). These findings suggest that maternal sepsis is associated with an increased risk of critical maternal complications.

Table I: Basic demographics of females enrolled in the study (n = 200)

Variable	F (%) or Mean \pm SD
Age (in years)	29.09 \pm 3.02
BMI (kg/m ²)	26.30 \pm 2.07
Obesity	120 (60%)
Gestational age (weeks) at delivery	33.45 \pm 7.42
Parity	
0-2 children	30 (15%)
Multiparous (>2 children)	170 (85%)
Residential area	
Rural	130 (65%)
Urban	70 (35%)
Outcome of prenatal and maternal sepsis	
Miscarriage	32 (16%)
PROM (Premature Rupture of Membranes)	126 (63.4%)
Preterm birth	80 (40%)
Mode of delivery	
Vaginal delivery	90 (45%)
Cesarean section	110 (55%)

Table 2: Association Between Sepsis and Perinatal Outcomes (N=200)

Outcome	With Sepsis (n=200)	Without Sepsis (n=200)	p-value
Preterm Birth (<37 weeks)	72 (36%)	30 (15%)	0.001**
PROM	48 (24%)	25 (12.5%)	0.005**
NICU Admission	40 (20%)	18 (9%)	0.002**
Neonatal Sepsis	30 (15%)	10 (5%)	0.010**
Perinatal Mortality	10 (5%)	3 (1.5%)	0.050*

Table 3: Association Between Maternal Complications and Sepsis (N=200)

Complication	With Sepsis (n=200)	Without Sepsis (n=200)	p-value
Pre-eclampsia	28 (14%)	12 (6%)	0.015*
Pulmonary Embolism	20 (10%)	7 (3.5%)	0.020*
Other Severe Complications	5 (2.5%)	2 (1%)	0.100

DISCUSSION

Mother sepsis is a severe illness characterised by organ failure caused by infections during pregnancy, delivery, post-abortion, or the postpartum period. It is a significant public health issue and ranks among the top five causes of mother mortality during pregnancy and the postpartum period.^{13, 14} Maternal sepsis, as defined by the World Health Organisation (WHO), is a critical illness characterised by organ failure caused by infection occurring during pregnancy, delivery, post-abortion, or the postpartum period. Maternal sepsis is a major cause of death and illness globally.¹⁵ Maternal sepsis accounts for 10.7% of worldwide maternal fatalities per year, as stated in the WHO study.¹⁶

Women in nations with inadequate resources bear the majority of the responsibilities associated with sepsis. Inadequate diagnostic tools, inadequate treatment, insufficiently trained birth attendants, inadequate infection prevention and control measures, and limited access to clean water and sanitary supplies all contribute to a high incidence of maternal sepsis and its associated mortality as well as morbidity in unindustrialized nations.¹⁷ While

high-income nations have made substantial progress in reducing maternal sepsis-related deaths and illnesses, low-income countries have been slower in adopting the measures recommended by the WHO to mitigate the effects of maternal sepsis.¹⁸

Direct obstetric infections rank as the third leading cause of maternal death worldwide, accounting for about 10.7% of all maternal fatalities. Among these deaths, severe sepsis has a mortality rate of 7-8%, which may rise to 20-40% if organ failure is present, and up to 60% if shock ensues.^{19, 20} The diagnoses, diagnosis, and management of critically sick pregnant individuals are not consistent, particularly in areas with limited resources.¹⁹

Pregnancies complicated by antepartum sepsis had an increased likelihood of experiencing placental malfunction. Maternal sepsis often leads to pregnancy loss.²¹ Knowles documented the results of foetal development in pregnant women who had sepsis throughout each of the three trimesters. Out of 270 instances, 238 children were delivered alive and were able to go home, resulting in a rate of 88.1%. Foetal demise mostly occurs during the second trimester of pregnancy and is primarily linked to chorioamnionitis. Out of the 22 instances, the foetal infection rate was 81.8%.²² In a parallel investigation, Liu et al. discovered that stillbirth constituted 20% (9 instances) of the total, whereas induced abortion was seen in 10 cases (22%).²³ Our research found that 16% of females who had maternal sepsis had pregnancy loss or miscarriage.

In our study, we observed that 63.4% females presented with PROM and urgently delivered either through vaginal delivery or cesarean section. Preterm births occurred in 40% females and mostly deliveries were done by cesarean section (55%).

Liu et al. found that the sepsis group had significantly worse outcomes for both the mother and foetus. This included a higher maternal and fetal mortality, earlier preterm deliveries, and more chances of low birth weight. The research provided insights into probable causes and variables that increase the risk of death in sepsis, which might potentially influence the development of future treatments for sepsis.²³

CONCLUSION

The chances of adverse outcome of maternal and perinatal sepsis are high and leads to severe life risking prognosis. But usually, pregnant females do not bother for this severe condition and could not attain facilities due to lack of knowledge and awareness about the disease and its complications. Therefore, not in future, we will implement counseling sessions during antenatal visits or after delivery for proper antenatal check-up, signs of sepsis and its hazardous consequences.

Conflict of Interest: None

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