

# A Retrospective Study of Puerperal Infection and its Aftermath: Current Scenario from a Tertiary Healthcare Centre, Telangana, India

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## ABSTRACT

**Introduction:** Even after decades of the development of low-cost and effective antibiotics, puerperal infections remain an important cause of preventable maternal morbidity and mortality.

**Aim:** The aim of the present study was to determine the risk factors, morbidity, and mortality associated with puerperal infections.

**Materials and Methods:** A retrospective study was conducted from March 2021 to October 2021, at the Obstetrics and Gynaecology Department of Gandhi Hospital in Telangana, India. The study included all women who delivered in this hospital and were referred within 42 days after delivery with fever and any of the following symptoms: pain abdomen, malodorous lochia, abdominal distention, subinvolution of the uterus, pelvic abscess, peritonitis, any system/organ failure, or shock. Various risk factors such as age, parity, socioeconomic status (according to the modified Kuppuswamy scale), BMI, rupture of membranes, mode of delivery, and comorbidities associated with puerperal infection were assessed. Complications following puerperal infection were also studied. Data analysis was performed using SPSS version 23.0, and the results were presented in frequency and percentages of categorical variables.

**Results:** During the study period, there were 161 cases of puerperal infection. The majority of cases were between the age group of 26-30 years, constituting 72 (44.7%) cases. Among them, 86 (53.4%) cases were multiparous, 50 (31%) cases were primiparous, 10 (6.2%) cases were second gravida, and 15 (9.3%) cases were third gravida. Lower middle-class women accounted for 67 (41.6%) cases, and 85 (52.7%) cases were in the overweight range. Prolonged premature rupture of membranes for more than 24 hours was observed in 78 (48.4%) cases. Caesarean section was the mode of delivery for 90 (56%) cases of puerperal infection cases. The most commonly associated comorbidities were anaemia in 63 (39.1%) cases, severe preeclampsia in 47 (29.1%) cases, abruption in 31 (19.2%) cases, and diabetes in 20 (12.4%) cases. Prolonged hospital stay was observed in 144 (89.4%) cases, wound gaping in 26 (16.1%) cases, and disseminated intravascular coagulation in 24 (14.9%) cases. A total of 31 (19.2%) cases of women succumbed, mostly due to multi-organ failure.

**Conclusion:** Early diagnosis, proper ICU facilities at all levels of healthcare, timely referral to tertiary facilities, health education, and strict aseptic measures would be crucial in tackling this menace.

**Keywords:** Maternal mortality, Morbidity, Prevention, Puerperal infection, Septicaemia

## INTRODUCTION

One of the immediate threats to any mother delivering her child worldwide is "Puerperal Sepsis," as noted by Buddeberg BS et al., and Montgomery AL et al., in their national surveys [1,2]. The leading cause of maternal mortality was postpartum haemorrhage, followed by puerperal sepsis, and the subsequent cause was preeclampsia and eclampsia [3]. It was noted that puerperal infections cause approximately 17.2% of maternal deaths in the esteemed "Million Death Study" published in 2014 [1]. It accounts for approximately 12,300 maternal deaths that could have been prevented by appropriate protocols and aseptic precautions [1].

Puerperal sepsis is defined by the WHO as an infection of the genital tract, occurring any time between rupture of membranes or labor and the 42<sup>nd</sup> day postpartum, with two or more of the considered symptoms being pelvic pain, fever, abnormal vaginal discharge, and delay in the reduction of the size of the uterus. The WHO has also defined "Puerperal Infection" as including both genital and non-genital infections in the obstetric population [4].

Normally, the abdominal wall and reproductive, genital, and urinary tracts are highly sterile environments that can be introduced to bacteria either from physiological or iatrogenic trauma during childbirth or abortion [5]. While pregnancy is a unique immunological state undergoing a multitude of variations, increasing the infection

load on the immune system can have serious consequences. Improperly managed puerperal infections can lead to acute kidney injury, acute liver injury, disseminated intravascular coagulation, wound gaping, the need for mechanical ventilation, and even death [6]. Various maternal predisposing factors have been identified, such as maternal obesity, mode of delivery, and comorbidities such as diabetes mellitus, anaemia, and preeclampsia [6]. Multiple pathogens have been identified as the cause of infections, with the most common being *E. coli*, *Klebsiella*, *Pseudomonas*, and Methicillin-Resistant *Staphylococcus Aureus* (MRSA) [7].

According to a recent study, approximately 1-6 people in every 10,000 deliveries had maternal morbidity due to puerperal sepsis, and approximately 17 deaths in every 100 maternal deaths were due to sepsis [8]. As it is a significant contributor to both maternal mortality and morbidity, its burden in present-day society needs to be regularly monitored by studies in order to establish advanced and appropriate regulations and protocols wherever required. In the Indian scenario, apart from medical morbidity, it can also have economic consequences for the families involved. There is a requirement for an in-depth analysis of such causes concerning the cases, aetiopathogenesis, varied clinical presentations, and principles of management to prevent the progression of infection to puerperal sepsis, its complications, and bacterial resistance

[9]. With this background, the present retrospective study was conducted with the aim of determining the risk factors, morbidity, and mortality associated with puerperal infections.

## MATERIALS AND METHODS

A retrospective study was conducted from March 2021 to October 2021 in the Department of Obstetrics and Gynaecology at Gandhi Medical College, Telangana, India. Institutional Ethical Committee approval was obtained (IEC/GMC/2021/01/09).

During the study period (January 2019 to September 2019), there were approximately 7,150 admissions in the Department of Obstetrics and Gynaecology. Out of 5,168 deliveries, 17 (0.3%) resulted in puerperal infection. Among the 161 cases of puerperal infection, 144 cases (89.4%) were referred cases.

**Inclusion and Exclusion criteria:** The inclusion criteria for the study included all women who delivered in the hospital and were referred within 42 days after delivery with fever and any of the following symptoms: abdominal pain, malodorous lochia, diarrhea, vomiting, wound infection, abdominal distention, sub-involution of the uterus, pelvic abscess, peritonitis, any system/organ failure, or shock. Patients with fever during pregnancy, more than 42 days after delivery, miscarriage, or fever due to COVID-19 infection were excluded.

Various risk factors such as age, parity, socioeconomic status (according to the modified Kuppuswamy scale [10]), BMI, rupture of membranes, mode of delivery, and comorbidities associated with puerperal infection were assessed. Complications following puerperal infection were studied.

## STATISTICAL ANALYSIS

Data analysis was performed using SPSS (version 23.0) for Windows, and the results were presented in frequencies and percentages of categorical variables.

## RESULTS

The results showed an incidence of 161 (2.2%) cases of puerperal infection. The majority of cases belonged to the age group of 26-30 years, with 72 (44.7%) cases [Table/Fig-1] [11]. Most of the cases were multigravida, accounting for approximately 86 (53.4%) cases, while 50 (31%) cases, 10 (6.2%) cases, and 15 (9.3%) cases were primiparous, second gravida, and third gravida, respectively. Out of the 161 cases, 144 (89.4%) cases were referred cases. Among the cases, 98 had a history of premature rupture of membranes, with 78 (48.4%) cases having a rupture history of

Age groups n (%)	
15-20	13 (8%)
21-25	33 (20.4%)
26-30	72 (44.7%)
31-35	26 (16.1%)
>35	17 (10.5%)
Socioeconomic status n (%)	
Lower class	37 (22.9%)
Upper lower class	42 (26.08%)
Lower middle class	67 (41.6%)
Upper middle class	15 (9.3%)
Upper class	0 (0%)
BMI n (%) [11]	
<18.5 (Underweight)	0 (0%)
18.5-24.9 (Normal)	34 (21%)
25-29.9 (Overweight)	85 (52.7%)
30-34.9 (Obese)	42 (26%)

[Table/Fig-1]: Frequency of puerperal infection in different age groups, socioeconomic status groups and BMI groups [11].

more than 24 hours and 20 cases (12.4%) having a rupture history of less than 24 hours.

Approximately 90 (56%) cases of the puerperal infection cases were delivered by caesarean section, while 71 (44%) cases were delivered vaginally.

The most prevalent comorbidity associated with puerperal infection was anaemia (52.4%), followed by severe preeclampsia (29.5%) [Table/Fig-2].

Co-morbidities	n	%
Diabetes mellitus	20	12.4%
Ante partum haemorrhage	31	19.2%
Severe pre eclampsia	47	29.2%
Anaemia	63	39.1%

[Table/Fig-2]: Prevalence of comorbidities associated with puerperal infection. N=161

In the present study, fever was the presenting complaint in 92% (148) cases, which was also associated with abdominal distension in 42 (26%) cases and wound site discharge and induration in 36 (22%) cases.

Prolonged hospital stay was the most common complication associated with puerperal infection, constituting about 144 cases. Approximately 31 maternal deaths were due to complications following puerperal infection [Table/Fig-3]. MRSA was the most common pathogen isolated from the blood, accounting for 68 (42.2%) cases, followed by E.coli in 42 (26.08%) cases, Klebsiella in 32 (19.8%) cases, and pseudomonas in 19 (11.8%) cases. Puerperal infection was more common in women with rupture of membranes lasting more than 24 hours, observed in 61 (38%) cases.

Complications	n	%
Wound gaping	26	16.1
Disseminated intravascular coagulation	24	14.9
Acute kidney injury	42	26
Acute liver injury	10	6.2
Re-laparotomy	16	9.9
Post partum hysterectomy	14	8.6
Prolonged hospital stay	144	89.4
Need for mechanical ventilation	36	22.3
Maternal death	31	19.2

[Table/Fig-3]: Complications following the puerperal infection in the current study. N=161

## DISCUSSION

The present study indicates that the incidence rates have relatively improved, while the mortality rate is relatively higher due to it being a state-level tertiary care centre. Early and appropriate interventions at peripheral healthcare facilities can significantly reduce this mortality rate as well.

In this study, most of the women belonged to the age group of 26-30 years (46%). The majority were multiparous, constituting 53.4% (86 cases), which is similar to a study conducted by Khaskheli M et al., where 78.2% were multiparous [6]. Most of them were referred and unbooked cases, constituting about 144 cases (89.4%). A similar study was conducted by Marwah S et al., in which 94% of cases were unbooked and belonged more commonly to a lower socioeconomic status (46%) [12]. The authors stated that 67% of cases had a caesarean section as the mode of delivery, prolonged rupture of membranes was seen in 42% of cases, anaemia in 42% of cases, pain abdomen in 70% of cases, fever in 100% of cases, and malodorous discharge in 27% of cases [12].

In the present study, the majority of cases belonged to the lower-middle socioeconomic status (41.6%) according to the modified

Kuppuswamy scale, which is similar to the study by Marwah S et al., [12]. Women who underwent caesarean sections had a higher risk of infection, constituting 56% of cases. In contrast, the studies conducted by Khaskheli MN et al., found that 77.5% were delivered vaginally and 22.48% underwent caesarean section. Karsnitz DB et al., in their clinical review, stated that caesarean birth carries the greatest risk for uterine infection [6,13].

Analyses of risk factors for puerperal infection showed that it is more commonly seen in patients with a BMI greater than 25, anaemia, and gestational diabetes mellitus, which are independent risk factors for infection, similar to a study conducted by Bhaktawar S et al., [3]. Therefore, proper pre-pregnancy counseling and correction of GDM and anaemia should be done antenatally to prevent puerperal infection. Proper vigilance is also important for patients with antepartum haemorrhages and severe preeclampsia during labour and postpartum to enable early identification and treatment of infection. In the study conducted by Song H et al., puerperal infection was found in patients with a BMI greater than 25 (31 cases), premature rupture of membranes in 29 cases, diabetes mellitus in 32 cases, and anaemia in 30 cases [7].

In the present study, the incidence of puerperal wound infection was seen in 16.3% of cases, which is almost in line with Karsnitz DB et al., who stated that the incidence in developing countries is about 20% [13]. MRSA was the most common pathogen isolated from the blood in the present study, accounting for about 42.6%, followed by E.coli (26.2%), Klebsiella (19.6%), and Pseudomonas (11.4%). In the study conducted by Song H et al., gram-negative bacteria were detected in 60% of cases, gram-positive bacteria in 35% of cases, and fungi in two cases (5%) [7]. Staphylococci accounted for 14.5%, E.coli accounted for 27.5%, Klebsiella for 5%, and Pseudomonas for 10% [7].

In the present study, puerperal infection was more common in women with rupture of membranes longer than 24 hours (38%), which is relatively less compared to the study by Khaskheli M et al., where absent membranes were found in 83.7% of cases [6].

The most common clinical features seen in the present study were fever (92%), abdominal distention (26%), and wound site discharge and induration (22%). Prolonged hospital stay was seen in 90.1% of cases. Similar results were seen in the study conducted by Khaskheli MN et al., [6]. Fever was the most prevalent symptom (98.1%) in the study by Singh P et al., [9]. In the study conducted by Khaskheli MN et al., DIC was seen in 17.8% of women with puerperal infection, and 8.5% of cases resulted in maternal deaths [6].

Proper education at the patient level, early diagnosis, management, and timely referral to higher centres at every healthcare facility, as well as audit of cases and development of new interventions, clinical protocols, training of healthcare personnel, and infection

control programs should be implemented at the government level. These measures together can decrease the disease burden and improve the quality of women's lives, which is an indirect indicator of a better country.

### Limitation(s)

The data in this study does not represent the data at every level of the healthcare system as many cases go unreported at peripheral healthcare facilities. Therefore, more studies are required to formulate protocols and reduce maternal mortality and morbidity.

### CONCLUSION(S)

The study indicates that the incidence rates of puerperal infection have relatively improved, but the recorded mortality rate is relatively higher due to the referral of more complicated cases to this tertiary care centre in the state. The responsibility to reduce the burden of the disease lies at every level: patients, healthcare personnel, and the government.

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