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Original Research Article

Burden of puerperal sepsis and its relation with maternal mortality

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ABSTRACT

Background: Puerperal sepsis, an infection of the genital tract, can appear at any time between the time of membrane rupture or labour to 42nd day after delivery. It accounts for 15% of maternal mortality. Aims of this study are to determine the incidence of puerperal sepsis and the associated mortality rate and explore socioeconomic risk factors of puerperal sepsis.
Methods: This prospective longitudinal study was conducted in Obstetrics and Gynecology department at the GGSMC and H, Faridkot, from November 2021 to October 2022. Inclusion criteria were: any patient presenting either immediately after delivery/abortion or within 42 days of these events with fever and any of the following: abdominal pain, malodorous lochia, abdominal distention, uterine tenderness, pelvic abscess, peritonitis, mechanical or foreign body injury, organ failure, or shock.
Results: The incidence of puerperal sepsis among the women was 6.37 per 100 population at-risk in our study sample. Laparotomies were performed on 17 patients, primarily because to abdominal collection. Four patients experienced uterine perforation, and one of them also had gastrointestinal injury. The maternal deaths attributed to puerperal sepsis were 19.2%.
Conclusions: The morbidity and mortality of women from puerperal sepsis are indicators of the quality of obstetric care in the area. The incidence of maternal sepsis may be reduced with the support of initiatives to encourage early recognition and effective therapy. Future study must focus on exploring the causes of anaemia and the factors that influence women going to unsafe delivery and abortions, so that evidence-based policies at the community level.

Keywords: Morbidity, Mortality, Puerperal sepsis, Surgery

INTRODUCTION

Puerperal sepsis is a major cause of maternal morbidity and mortality worldwide, especially in low- and middle-income countries.[1] Despite being preventable, it accounts for 11% of maternal mortality globally.[2] The World Health Organization in 1992, has defined Puerperal sepsis as an infection of the genital tract occurring any time between the rupture of membranes or onset of labor and the 42 days after delivery or abortion in which at least two of these symptoms should be present vis pelvic pain, fever, abnormal vaginal discharge, aberrant odour or foul-smelling discharge, or a delay in uterine involution. Recently WHO defined maternal sepsis as a serious condition causing organ dysfunction resulting to infection during pregnancy, intrapartum, post-abortion, or the post-partum period.[3] Puerperal sepsis is septicaemia contracted by women immediately (within six weeks) or soon after giving birth or experiencing a miscarriage.[4] The clinical symptoms include fever, pelvic pain, foul-smelling vaginal discharge, and subinvolution of the uterus during the period. The severe case of sepsis may result in, organ failure, poor cellular perfusion, low blood pressure, and systemic inflammatory response syndrome, all

accompanied by infection.[5,6] Risk factors for puerperal sepsis include pre-existing STIs, prolonged membrane rupture, retained foetal products, Diabetes, surgical or instrumental delivery, anaemia, malnutrition, and poor infection control measures. Long-term health problems such chronic pelvic inflammatory disease (PID) and infertility may develop as a result of puerperal sepsis. [1,2] The issue of puerperal sepsis is of great importance for developing nations such as India, crucial. Puerperal sepsis continues to be a major cause of maternal death despite the development of safe, efficient, and economical antimicrobial medicines.[7] A deadly tried of preventable causes of maternal deaths in developing countries includes sepsis, haemorrhage, and eclampsia.[8] In developing countries, with lingering poverty, maternal mortality due to sepsis is a continuing representation of maternal health inequality. According to statistics from the WHO, puerperal sepsis has been identified as the second leading cause of maternal mortality in developing countries.[9] According to a study, sepsis caused nearly 15% of maternal deaths in India. [10] Puerperal sepsis was the second-leading (13.2%) cause of maternal mortality in rural areas, after postpartum haemorrhage.[11] In India, 50% of maternal deaths attributed to sepsis result from illegally induced abortions. Thus, the puerperal sepsis during the post-abortal phase may be a consequence of unsafe abortion as well. [12,13] However, the concern remains the same since maternal sepsis is largely preventable but still chokes the maternal health care system, making itself a public health problem. From low and middle-income countries, small cohort studies that have focused on either post-abortal sepsis or on post-delivery sepsis postpartum sepsis have examined the evidence of maternal death due to sepsis.[13-17] However, there is need to study the menace using a holistic approach, that must include association of factors which trigger the possibility of falling down with sepsis after child birth.

The health of a female is a complex play of status of nutrition, equitable distribution, financial stability of the family head as well as service availability and attitude towards available services. Keeping this in view, the present study is planned to assess the incidence of puerperal sepsis among patients both in post-abortal and postdelivery period, presenting with puerperal sepsis in a tertiary level hospital of Punjab. The study findings will help to reform the institutional protocols, which will affect the planning of preventive strategies at various tiers of healthcare system. It is an established fact that occurrence of puerperal sepsis has both social and medical factors, leading to complications to the extent of maternal and perinatal mortality. These social factors have been identified at multiple levels like individual, community and health system factors. Hence, the occurrence of these social factors is complex and contextual. Therefore, it becomes imperative to look into local societal reasons leading to puerperal sepsis so as to take program and policy level decisions. The findings of this study will guide steps for strengthening the existing healthcare system. This is the first study from a tertiary care hospital in Punjab.

METHODS

This prospective longitudinal study was conducted in Obstetrics and gynaecology department at the GGSMC and H, Faridkot, from November 2021 to October 2022. Objectives of this study were to determine the incidence of puerperal sepsis among post-partum and post-abortal women in a tertiary care health facility and to assess the distribution of socio-economic characteristics of patients with puerperal sepsis.

Inclusion and exclusion criteria

Inclusion criteria were pregnant women coming for delivery, women admitted either immediately after or within 42 days of vaginal delivery, caesarean section (LSCS) or miscarriage, woman having fever of more than 100.4^0 F maintained over 24 hours or recurring within 10 days and one or more symptoms of pelvic pain, abnormal vaginal discharge or subinvolution. Exclusion criteria were Fever during pregnancy or more than 42 days after delivery, LSCS or miscarriage, fever due to medical causes, mastitis, urinary Tract Infection (UTI), thrombophlebitis.

The data collection included demographic details (age, marital status, residence) of the patient, date of admission, present and past obstetric history, treatment given. Information was also gathered on family history, personal history, medical history, chief complaint, place of delivery (whether institutional/non-institutional), history of premature rupture of membranes, number of per vaginal examinations during labour. Physical examination for each patient and the samples of blood (CBC, RFT, LFT), urine and vaginal swabs were collected as routine laboratory investigation and response to treatment (recovery, mortality, ICU care). Data was analysed using suitable statistical software and appropriate test of significance was applied.

RESULTS

Incidence of puerperal sepsis

Out of a total of 3955 ANC and PNC admission during the study period, total 252 cases of puerperal sepsis were admitted and recruited in the study. Thus, the incidence of puerperal sepsis among the women in our study setting was 6.37 per 100 population at risk.

Social and demographic profile

In our study majority of the patients belonged to the age group of 20-30 years. However, 7% of patients were <20 years of age. Most of the cases were unbooked and referred from nearby district hospitals. It has also come to notice that the majority of patients were illiterate (83.3%), belonged to rural household (95.2%), head of the family worked as unskilled labourer (88.9%) and were unbooked (92.1%) (Table 1).

Table 1: Social and demographic profile.

Baseline characteristics	N	%	P value*
Age (years)			
<20	18	7.1	<0.01
20-30	192	76.2	
>30	42	16.7	
Residence			
Rural	240	95.2	<0.01
Urban	12	4.8	
Literacy			
Illiterate	210	83.3	<0.01
Primary	8	3.2	
Middle	23	9.1	
High school	11	4.4	
Occupation of head of family			
Unemployed	6	2.4	<0.01
Unskilled	224	88.9	
Semi skilled	16	6.3	
Skilled	6	2.4	
Marital status			
Married	246	97.6	<0.01
Unmarried	6	2.4	
Booking status			
Booked	20	7.9	<0.01
Unbooked	232	92.1	

*Single proportion z-test of significance

Clinical and biological characteristics of patients

Most of the patients were multipara. 40% patients had history of MTP for unwanted pregnancy in the past. Majority of the patients were married. Of the total participants 27(10.7%) were primipara. The antecedent pregnancy event was vaginal delivery in most cases. However, 39% of patients reported with history of miscarriage. There were a total 100 cases of abortion, out of which 65% were second trimester miscarriages. Also 40% of the abortions and 32% of the vaginal deliveries had been conducted at home or at unauthorized centers untrained person. The most frequent presenting complaint was that of fever and tachycardia was the most frequently observed sign which was present in all the patients (Table 2).

Medical and personal history of the patients

Out of the total recruited patients, 90.1% (N=207) had anemia, 5.2% (N=13) had diabetes, 3.6% (N=9) had tuberculosis, 4.0% (N=10) suffered from obesity and 69.8% (N=176) maintained poor hygiene (Table 3).

Management, complications and surveillance of patients

Majority of the patients were admitted for 2-4 days, had grade 1 sepsis and did not require ICU admission. However, out of the 51 patients needing ICU care 42 had grade 4 sepsis and duration of hospital stay was either less than 48 hours or more than 96 hours.

Table 2: Clinical and biological characteristics of patients (n=252).

Parameters	N	%	P value*
Antecedent pregnancy event			
Abortion	100	39.7	<0.01
Spontaneous	0	0	
Induced	100	39.7	
Vaginal Delivery	103	40.9	
Caesarean Delivery	49	19.4	
Place of delivery/abortion			
Institutional	178	70.6	<0.01
Home/unauthorized centre	74	29.4	
Abortion	40	-	
Vaginal delivery	34	-	
Parity			
Primipara	27	10.7	<0.01
Multipara	225	89.3	
Puerperal day of presentation (days)			
1-3	194	80.0	<0.01
3-6	23	9.1	
6-9	22	8.7	
>9	13	5.2	
Presenting complain			
Palpitations	231	91.7	<0.01
Fever	240	95.2	<0.01
Malodourous discharge	88	34.9	<0.01
Pelvic pain	68	27.0	<0.01
Uterine tenderness	14	5.6	0.019
Abdominal distension	17	6.7	0.080

*Single proportion z-test of significance

Table 3: Medical and personal history of the patients (n=252).

Parameters	N	%	P value*
Anemia			
Yes	207	90.1	<0.01
No	45	17.9	
Diabetes Mellitus			
Yes	13	5.2	0.01
No	239	94.9	
Tuberculosis			
Yes	9	3.6	<0.01
No	243	96.4	
Obesity			
Yes	10	4.0	<0.01
No	242	96.0	
Poor hygiene			
Yes	176	69.8	<0.01
No	76	30.2	

*Single proportion z-test of significance

A laparotomy was done for 17 patients, mostly due to abdominal collection. In 4 patients there was uterine perforation and one of them had gut injury also (Table 4).

Table 4: Management, complications and surveillance of patients (n=252).

Parameters	N	%	P value*
Duration of hospital stay (hours)			
<48	35	13.9	<0.01
48-96	164	65.1	
>96	53	30.0	
Severity of sepsis			
Grade I	191	75.8	<0.01
Grade II	13	5.2	
Grade III	6	2.4	
Grade IV	42	16.7	
ICU admission			
Yes	51	20.2	<0.01
No	201	79.8	
Operative intervention need			
Conservative	238	94.4	<0.01
Laparotomy	17	6.7	0.08
Relaparotomy	2	0.8	<0.01
Uterine rent repair	4	1.6	<0.01
Gut repair	1	0.4	<0.01
Peritoneal wash	16	6.3	0.05
Outcome			
Recovered	236	93.7	<0.01
Near Miss	32		
Mortality	10	4.0	
Post partum	5		
Post abortal	5		
LAMA	6	2.4	

*Single proportion z-test of significance

Relation of puerperal sepsis with maternal mortality

During the study period a total of 10 patients succumbed to their ill health, out of which 5 patients were those who had a history of unsafe abortion, including one unmarried girl. In two of the patients the antecedent event was caesarean delivery. Total maternal deaths during the study period were 52, therefore maternal deaths attributed to puerperal sepsis were 19.2%. Sepsis induced by unsafe termination of pregnancy led to maternal mortality in 7 (13.5%) patients and out of those 5 cases were those of unsafe abortion.

Distribution of factors in sample population as compared to general population

The single proportion z-test was administered to assess the distribution of sociodemographic factors, patient history and disease characteristics as well as outcome in the given sample as compared to their distribution in general population. Assuming that every factor under study must be represented by at least 10% of the general population of which this sample was drawn, the population proportion was kept at 0.10. The proportion of factor with higher distribution (for categorical variables) or the desired distribution under study (for dichotomous variables with yes/no responses) was taken as the sample proportion. The distribution of factors in our sample was statistically significantly different from the distribution of these characteristics in general population from which this sample was drawn. Our sample of puerperal sepsis primarily composed of unbooked patients, poor socioeconomic characteristics including unemployment and illiteracy of head of family, rural background, patient history of anemia, diabetes, tuberculosis presenting as fever, palpitations, malodorous discharge etc. The other statistically significant distributions as compared to general population included majority of grade I infection, with hospital stay of maximum patients for 48-96 hours. Most of our patients were treated using conservative approach. The distribution of presenting symptom of abdominal distension and surgical approach of laparotomy was similar in population and our sample (non-significant finding).

DISCUSSION

We studied and followed the cases of puerperal sepsis reporting to our facility. This is the first prospective cross-sectional study on postpartum patients conducted in the department of OBG, Guru Gobind Singh Medical College & Hospital, Faridkot. During the period of our study, a total of 3955 obstetric patients were admitted in Department of OBG, out of these 252 were diagnosed with puerperal sepsis. Therefore, the incidence of puerperal sepsis is 6.37%. And out of those 42 cases were those of severe sepsis accounting for 17% of sepsis patients. The total maternal mortality during the study period in our institute was 52. Out of these 10 patients fitted the criteria of puerperal sepsis. Therefore, puerperal sepsis is responsible for 19.2% of maternal deaths as per our study. The incidence of puerperal sepsis as in our study is comparable to that in Ethiopia 7.27% and is higher than that in Pakistan (1.7% and 3.89%), Vietnam (1.7%), India (2.5%, 3.9%), Ireland (0.18%), USA (0.0294), Nigeria (0.9%), Uganda (2%).[18-27] This variation could be due to different definition and inclusion criteria used, also due to variations in demographic profile and study period. The attributable death rate has been reported between 13-20% in different studies. Similarly in our study maternal mortality attributed to puerperal sepsis has come out to be 19.2%, which is higher than the national measure of 11%.[2] This could be due to our hospital being a tertiary level facility, one that caters to a perimeter of more than 80 km on average.

The peril of puerperal sepsis is more in women who have not had the privilege of formal education. In our study 83% of women were uneducated. This result is consistent with studies in Ethiopia, Pakistan, and California, as postnatal women with a lower level of education level were at a significantly greater risk of developing puerperal sepsis.[20,28,29] This could be due to lack of awareness of risk factors among illiterate women. An educated woman would be having healthier reproductive practices, good health-seeking behavior, a positive attitude about health care and nutrition. Rural dwellers were more likely to develop sepsis. This is in line with a study conducted in

Ethiopia and Uganda. However, a study conducted in Bangladesh, showed no such association. [20,28,30] The association may be due to home delivery, lack of implementation of aseptic precaution in rural health centres, low awareness about ANC follows up and low level of sanitation in rural areas. The mode of delivery has a significant role in a woman's risk of affliction with sepsis as per studies from Ethiopia, Kenya, Nigeria, India, Germany, California, and Ireland, Uganda, Tanzania, Nigeria, suggesting increased incidence of sepsis in post caesarean delivery patients. [18,24,26-29,31-35] However, patients with Caesarean delivery developing sepsis were less frequent during the course of our study. Pregnancy complicated by medical disorders or obstetric events is liable to acquire sepsis.[25,36] Complications like anemia, obstructed labour, prelabour rupture of membranes, pelvic infection, pyrexia due to typhoid or dengue have been seen as causes of aggravation of sepsis. This could be due to nosocomial infections acquired from an ICU setting in such patients. Similarly, 92% of our study participants were anemic. The risk of acquiring sepsis is more in women who are referred and belonging to low socio-economic status, consistent with findings of recent studies.[18] It is therefore suggested for preparedness of the higher institute for receiving sick patients.[28] Total 9.6% patients died due to sepsis following unsafe abortion. The antecedent pregnancy was abortion in 39% of sepsis cases which is higher than that for general population. This is in harmony with global estimates of 4.7- 13.2%.[37] The global incidence of abortion was 39 per 1000 women in reproductive age group during the period 2015-2019.[38]

Limitations

This was a hospital-based study carried out in a tertiary care hospital where mostly sick patients are referred and therefore cannot reflect the precise incidence at the community level.

CONCLUSION

Maternal morbidity and mortality from puerperal sepsis reflects the quality of obstetric services in the region. Initiatives aimed at improving early recognition and effective management may help reduce the occurrence and outcomes of maternal sepsis. Therefore, provision of nearby decent facility preferably a government care centre equipped with trained personnel for termination of pregnancy is the need of the hour. It calls for government to provide for gynaecologists at the Community health centre level. Also, we need to identify and tackle the unmet needs of pregnancy. Unauthorized delivery centres must be identified and curbed by law enforcing agencies.

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