



A Five-year Review of Puerperal Sepsis and Its Complications at the Federal Medical Centre, Yenagoa, South-South Nigeria

**P. C. Oriji¹, D. O. Allagoa^{1*}, C. Ikoro¹, O. I. Oguche², V. K. Oriji³,
C. E. Unachukwu⁴, A. E. Ubom⁵ and G. Atemie¹**

¹Department of Obstetrics and Gynaecology, Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

²Department of Community Medicine, Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

³Department of Public Health, Ministry of Health, Yenagoa, Bayelsa State, Nigeria.

⁴Department of Obstetrics and Gynaecology, Niger Delta University Teaching Hospital, Okolobiri, Bayelsa State, Nigeria.

⁵Department of Obstetrics, Gynaecology and Perinatology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author PCO conceptualised the study, collated data, wrote the introduction, results and participated in writing of the discussion. Author DOA wrote the protocol of the study and supervised the entire research. Author CI managed literature searches and writing of the discussion. Author OIO participated in literature searches. Author VKO carried out microbiological studies. Authors CEU and AEU participated in writing the discussion. Author GA collected the data for the research. All authors read and approved the final manuscript.

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ABSTRACT

Background: Puerperal sepsis is a significant cause of maternal morbidity and mortality, especially in developing countries, Nigeria inclusive. It complicates 1% – 8% of all deliveries, and is responsible for 15% of maternal deaths.

Objective: To determine the incidence of puerperal sepsis, and its associated complications at the Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria, over a five-year period.

Materials and Methods: This retrospective survey was carried out between 1st January, 2016, and 31st December, 2020. Data were retrieved, entered into a pre-designed proforma, and analyzed using IBM SPSS version 25.0. Results were presented in frequencies and percentages for categorical variables, and mean and standard deviation for continuous variables.

Results: A total of 66 women were managed for puerperal sepsis out of 4,571 obstetric patients seen in the five-year period under review. Most women were unbooked (81.8%), and were delivered at home/unorthodox faith-based delivery units by traditional birth attendants (75.8%). *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella* spp were cultured in 54.8%, 12.9% and 12.9% of cases, respectively. There was no maternal mortality.

Conclusion: Puerperal sepsis remains an important public health problem in developing countries. While encouraging antenatal care and supervised hospital delivery is important for its primary prevention, early diagnosis, prompt and effective antibiotic and supportive therapy will prevent its complications.

Keywords: Puerperal; sepsis; morbidity; mortality; Nigeria; antenatal care; hospital delivery.

1. INTRODUCTION

The World Health Organization (WHO) defines puerperal sepsis as bacterial infection of the genital tract or its surrounding tissues, occurring at any time between the onset of rupture of foetal membranes or labour, and the 42nd day postpartum, in which two or more of the following are present: fever, pelvic pain, abnormal vaginal discharge, abnormal smell/foul odour discharge or delay in uterine involution [1]. Puerperal sepsis describes genital tract infection associated with childbirth. It is one of the leading causes of preventable maternal morbidity and mortality worldwide, but especially in developing countries, where it complicates 1% – 8% of all deliveries [2], and is responsible for 15% of maternal deaths [3,4,5].

The hallmark of puerperal sepsis is puerperal pyrexia, which is defined as a temperature of 38°C or higher, taken on two separate occasions at least 4 – 6 hours apart, excluding the first 24 hours after delivery. Differential diagnoses of puerperal sepsis include malaria, wound infection, septic pelvic thrombophlebitis, respiratory tract infections, urinary tract infections and breast infections.

Risk factors for puerperal sepsis include low socioeconomic status, unbooked status, prolonged rupture of foetal membranes, prolonged labour, multiple vaginal examinations, home delivery, anaemia in pregnancy, Caesarean section, retained products of conception, chorioamnionitis, obstructed labour,

manual removal of placenta, episiotomy/genital tract trauma, and harmful traditional birth practices.

Puerperal sepsis is usually polymicrobial, including aerobic and anaerobic organisms [2,6]. The offending organisms are normally resident in the vagina, or are acquired in the hospital during vaginal and operative delivery. The commonly isolated organisms from patients with puerperal sepsis in Nigeria are *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella* species [7,8].

The patient may present with pyrexia, tachycardia, lower abdominal tenderness, guarding, rebound tenderness and cervical motion tenderness. Clinical diagnosis of puerperal sepsis is made when any two of the following are present within 42 days after delivery; fever, lower abdominal pain, abnormal vaginal discharge, offensive vaginal discharge and uterine subinvolution [9].

The mainstay of treatment of puerperal sepsis is the use of broad-spectrum antibiotics, and uterine evacuation of septic retained products of conception, if present [6]. The WHO recommends broad-spectrum antibiotic therapy until the patient is fever-free for 48 hours. The following regimen is recommended: intravenous ampicillin 2 g 6-hourly, intravenous gentamicin 5 mg/kg body weight daily, and intravenous metronidazole 500 mg 8-hourly [6]. Important aspects of supportive care include correction of anaemia and electrolyte derangements, if present.

Untreated or poorly treated puerperal sepsis could result in early complications like anaemia, renal failure, systemic extension of the infection, with resultant septicaemia, septic shock, pelvic abscess and multiple organ failure, leading to death. Long term complications include chronic pelvic inflammatory disease, chronic pelvic pain, tubal damage, ectopic pregnancy, and compromised future fertility.

Strategies for prevention of puerperal sepsis should be targeted at women of reproductive age-group with health promotion and education. Concerted efforts should be invested in female education and empowerment. There should be incentives to encourage women utilize antenatal care and have skilled birth attendants at their deliveries. Enrolling men, community leaders and influencers to be involved in health care advocacy for women could go a long way in encouraging the adoption of healthy cultural practices. The objective of this retrospective study was to determine the incidence of puerperal sepsis and its associated complications at the Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

2. MATERIALS AND METHODS

This retrospective study was carried out in the Obstetric Unit of the Federal Medical Centre, Yenagoa, Bayelsa State, South-South Nigeria, between 1st January, 2016 and 31st December, 2020.

All the patients that were managed for puerperal sepsis in our facility during the period under review were included in this study. All the patients who did not have puerperal sepsis were excluded from the study.

In our centre, patients with puerperal sepsis are admitted into the postnatal ward, for in-patient management. They are treated with intravenous broad-spectrum, triple antibiotic regimen, which includes ceftriaxone, metronidazole and gentamycin. The antibiotic regimen is changed for any patient that does not respond to this first-line therapy. The second-line regimen used varies, and is usually dependent on the discretion of the managing consultant, based on results of microbial sensitivity tests.

Data were retrieved from the labour ward, delivery and theatre registers, and patients' folders. The extracted data were entered into a pre-designed proforma, and they included age,

marital status, level of education, state of residence, occupation, parity, booking status, presenting complaints, risk factors, place, mode and gestational age of delivery, maternal and perinatal outcomes, duration of stay in hospital and total number of deliveries during the period under review. Data were analyzed using IBM SPSS version 25.0. Results were presented in frequencies and percentages for categorical variables and mean and standard deviation for continuous variables.

3. RESULTS

3.1 Sociodemographic Characteristics of Women with Puerperal Sepsis

A total of 66 women were managed for puerperal sepsis out of 4,571 obstetric patients seen in the five-year period under review. The mean age of women with puerperal sepsis was 27.8 ± 5.7 years, with a modal (33.3%) age-group of 21 – 25 years. Majority of the women were married (69.7%), with secondary level of education (60.6%). Almost one-half (45.5%) of them were unemployed, and another 42.4%, were traders. These sociodemographic characteristics are shown in Table 1.

3.2 Obstetric Characteristics of Women with Puerperal Sepsis

Table 2 shows that almost one-half (48.5%) of the women were multiparous, with a median parity of two. The parity ranged between one and six. Most women were unbooked (81.8%), and were delivered at home/unorthodox faith-based delivery units by traditional birth attendants (TBAs) (75.8%). Majority of the women had spontaneous vaginal delivery (93.9%), at 38 weeks' gestation (66.7%).

3.3 Presenting Complaints and Duration of Symptoms of Women with Puerperal Sepsis

Fever (97.0%), abdominal pains (97.0%), and vaginal discharge (93.9%), were the most common presenting complaints. In the majority (39.4%) of the women, symptoms lasted between 15 to 21 days, as seen in Table 3. Three (4.5%) of the patients did not respond to the first-line antibiotic regimen, necessitating a change to second-line antibiotics. Only one (1.5%) patient required admission and management in the intensive care unit.

Table 1. Sociodemographic characteristics of women with puerperal sepsis

Characteristics	Frequency, N = 66	Percentage (%)
Age Group		
≥ 20 years	6	9.1
21 - 25 years	22	33.3
26 - 30 years	14	21.2
31 - 35 years	16	24.2
> 35 years	8	12.1
Mean age ± SD in years	27.8 ± 5.7	
Marital Status		
Married	46	69.7
Single	20	30.3
Level of Education		
Primary	26	39.4
Secondary	40	60.6
Occupation		
Unemployed	30	45.5
Trader	28	42.4
Farmer	4	6.1
Artisan	4	6.1

Table 2. Obstetric characteristics of women with puerperal sepsis

Characteristics	Frequency, N = 66	Percentage (%)
Parity		
Multiparity	32	48.5
Primiparity	28	42.4
Grand-multiparity	6	9.1
Median parity (Range)	2 (1 – 6)	
Booking Status		
Unbooked	54	81.8
Booked	12	18.2
Gestational age at delivery		
37 weeks	4	6.1
38 weeks	44	66.7
39 weeks	10	15.2
40 weeks	4	6.1
41 weeks	4	6.1
Median duration of labour (range) in hours	36.5 (26 – 72)	
Mode of Delivery		
Vaginal delivery	62	93.9
Emergency Caesarean section	4	6.1
Place of Delivery		
Home/TBAs' place	50	75.8
Primary Health Centre	15	22.7
Hospital	1	1.5
Accoucheur		
Traditional Birth Attendant	50	75.8
Nurse/Midwife	14	21.2
Doctor	2	3.0

**3.4 Microbial Culture and Sensitivity
Pattern of Women with Puerperal Sepsis**

As shown in Table 4, of the 66 women with puerperal sepsis, 62 (93.9%) had endocervical

swab microscopy, culture and sensitivity test done. Two cultures yielded no growth (3.2%). *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella* spp were cultured in 54.8%, 12.9% and 12.9% of cases, respectively. Ten (16.1%) cultures revealed mixed microbial growth.

Table 3. Presenting complaints and duration of symptoms of women with puerperal sepsis

Characteristics	Frequency, N = 66	Percentage (%)
Presentation/presenting complaint		
Fever	64	97.0
Abdominal pain	64	97.0
Vaginal discharge	62	93.9
Uterine subinvolution	20	30.3
History of PROM	16	24.2
Abdominal swelling	4	6.1
Vaginal bleeding	2	3.0
Prolonged obstructed labour	2	3.0
Duration of symptoms		
1 – 7 days	8	12.1
8 – 14 days	24	36.4
15 – 21 days	26	39.4
> 21 days	8	12.1

PROM = Prelabour rupture of foetal membranes

Table 4. Microbial culture and sensitivity pattern of women with puerperal sepsis

Variable	Frequency, N = 66	Percentage (%)
Culture and sensitivity		
Done	62	93.9
Not Done	4	6.1
*Result of culture	N = 62	
<i>Staphylococcus aureus</i>	34	54.8
Mixed growth	10	16.1
<i>Escherichia coli</i>	8	12.9
<i>Klebsiella</i> spp	8	12.9
No growth	2	3.2
*Drug sensitivity	N = 60	
Amoxicillin/Clavulanic acid	54	90.0
Ceftriaxone	36	60.0
Ofloxacin	34	56.7
Erythromycin	32	53.3
Gentamycin	28	46.7
Cotrimoxazole	26	43.3
Ampiclox	24	40.0
Ciprofloxacin	22	36.7
Sensitive to all tested drugs	16	26.7
Resistant to all tested drugs	4	6.7

*Multiple organisms cultured and sensitive drugs in some women, hence N>62 and 60 respectively

The isolated organisms were sensitive to Amoxicillin/Clavulanic acid combination, ceftriaxone, and ofloxacin, in 54 (90.0%), 36 (60.0%) and 34 (56.7%) patients, respectively. Sensitivity to all tested antibiotics was reported in samples from 16 women (26.7%), and resistance to all tested antibiotics was seen in less than a tenth (6.7%) of the women (Table 4).

3.5 Maternal and Perinatal Outcomes of Puerperal Sepsis

No maternal death from puerperal sepsis was recorded within the review period. However,

complications were reported in 27.3% of the women. Of the 18 (27.3%) women with complications, anaemia and abdominopelvic abscess were seen in eight (44.4%), while psychosis and surgical site infection were seen in two women (11.1%) each. Both patients with surgical site infection each received two units of blood transfusion.

There were two cases (3.0%) of perinatal mortality. Two babies (3.1%) had early neonatal sepsis, for which they were each admitted in the special care baby unit for 10 days, before discharge (Table 5).

Table 5. Maternal and perinatal outcomes of puerperal sepsis

Variable	Frequency, N = 66	Percentage (%)
Maternal outcome		
No complication	48	72.7
Complications	18	27.3
*Maternal complications	N = 18	
Anaemia	9	50.0
Abdominopelvic abscess	7	38.9
Surgical site infection	2	11.1
Psychosis	2	11.1
Median hospital stay in days (Range)	11 (3 – 27)	
Foetal outcome		
Alive	64	97.0
Died	2	3.0
Perinatal outcome	N = 64	
Normal Apgar score	62	96.9
SCBU Admission	2	3.1

*Multiple complications in some patients, hence N>18
SCBU = Special Care Baby Unit

4. DISCUSSION

A total of 66 women were managed for puerperal sepsis out of 4,571 obstetric patients seen in the five-year period under review, giving an incidence rate of 1.44%. This is higher than the values from Sokoto (0.9%) [10] and Maiduguri (0.78%) [7]. However, the incidence in our study was lower than the 1.7% in Ile-Ife [11], 9.34% in Port Harcourt [12], and 16.7% in Jos [13]. The incidence in the United Kingdom and United States of America has been reported to be between 0.2% and 0.6% [14]. These variations in incidence rates may reflect the sociodemographic and health-seeking behaviour of patients in the different regions of the world. Of the causes of maternal mortality in Nigeria, puerperal sepsis contributed 21.3% in Calabar [15], 11.1% in Enugu [16], 28.3% in Jos [17], 5.8% in Ogun [18], 1.89% in Jigawa [19], and 26.3% in Maiduguri [20].

None of the women in our study had tertiary level of education. Some other studies have reported tertiary level of education in 4.7% [10], 10% [12] and 6% [21] of affected women in Sokoto, Port Harcourt and Ethiopia, respectively. Poor educational and socioeconomic status are predisposing factors for puerperal sepsis. This buttresses the fact that when a woman is well educated and empowered, she tends to recognise danger signs early, and seeks medical help immediately.

About 75.8% of the patients in our study were delivered at home/TBAs' delivery units, where they had multiple unsterile vaginal examinations,

and harmful traditional practices, such as insertion of leaves into the vagina. These may have predisposed them to puerperal sepsis. This reflects the poor health-seeking behaviour of many women in the region where this study was conducted. Our finding was similar to the 70.1% that were delivered at TBAs'/homes/churches in Port Harcourt [12], but slightly lower than the 87.2% of patients that had unsupervised home deliveries in Sokoto [10]. and higher than the 59.1% reported in Maiduguri [7]. The aversion for hospital delivery, low socio-economic status/poverty, and preference for delivery at home/TBAs' are plausible reasons for these findings.

In our study, 97% of the women had fever. Fever is almost always present in puerperal sepsis. About 16% of the women had a history of pre-labour rupture of foetal membranes (PROM). This is similar to the 17.6% in Port Harcourt [12], but differed from the 21.6% reported in Sokoto [10]. Pre-labour rupture of foetal membranes was reported in a study in Amsterdam as an independent risk factor for puerperal sepsis [22]. Ignorance and poverty have been shown to affect cultural practices, health-seeking behaviour, and presentation to hospitals for management [23–25]. With rising inflation and cost of services and commodities in Nigeria; cost of health care is not excluded from this rise. Universal health insurance scheme is key in helping the poor and less privileged access quality health care.

Almost half (48.5%) of the women were multiparous in our study. This was contrary to the

report from the study in Sokoto, where puerperal sepsis was seen more (20.9%) in primiparous women [10], but in consonance with the study in Jos, where multiparous women were more affected [13]. Majority (81.8%) of the patients in our study were unbooked. This is similar to findings in Maiduguri, Sokoto, Ile-Ife and Port Harcourt, where 88% [7], 84.9% [10], 71% [11], and 87.7% [12] of the women were unbooked for antenatal care, respectively. Patients that are unbooked for antenatal care miss the opportunity of regular educational health talks given at the antenatal clinics by health professionals. These educational programmes contribute immensely to the prevention of adverse maternal and perinatal outcomes. Unbooked patients will also not have the benefit of vaginal delivery and expert care in the hospital. Unbooked status has continued to be associated with maternal/perinatal morbidity and mortality in our Centre, owing to the poor health-seeking behaviour of the women in the region where this study was carried out [26–30].

Of the 66 women with puerperal sepsis, 62 (93.9%) had endocervical swab microscopy, culture and sensitivity test done. Two (3.2%) yielded no growth, because they took antibiotics before presentation to the hospital. The culture in more than half (54.8%) of the patients yielded *Staphylococcus aureus*. This finding was similar to the studies in Maiduguri, Sokoto and Sudan, where most of the cultures yielded *Staphylococcus aureus* in 35.4% [7], 13.6% [10] and 39.5% [24], respectively. The commonest organism causing puerperal sepsis from studies done in tropical Africa is *Staphylococcus aureus*. The plausible reasons for this may be the sociocultural characteristics, genetic make-up, and similarities in host and immune status of the people in this region. Sampling techniques and contamination of samples may also be responsible. This finding is however, different from the finding in Port Harcourt, where most (57.7%) of the patients were infected with *Klebsiella* species, followed by *Escherichia coli* (22.3%) and *Staphylococcus aureus* (14.6%).

Most (90.0%) of the organisms isolated in this study were sensitive to Amoxicillin/Clavulanic acid combination, followed by ceftriaxone (60.0%), and ofloxacin (56.7%). The sensitivity to Amoxicillin/Clavulanic acid and ceftriaxone was an advantage in the women, because both drugs are safe during breastfeeding. However, the study conducted in Sokoto, revealed that the isolated organisms were most sensitive to ceftriaxone (10.9%), followed by ofloxacin (7.0%)

[10], while the study in Port Harcourt revealed that the isolated organisms were 100% sensitive to ceftriaxone, ceftazidime, ciprofloxacin, ofloxacin and gentamycin [12]. Quinolones have been shown to cause premature closure of the epiphyseal plate in lower animals. However, this effect has not been widely researched in humans. Therefore, their use in breastfeeding mothers and children is usually avoided, but can be used when the benefits outweigh the risks.

There was no maternal death from puerperal sepsis in this study. This may have been due to the fact that at presentation of the women to our hospital, they were managed promptly and aggressively with broad-spectrum antibiotics. Our Obstetric Unit has an emergency tray, which includes broad-spectrum antibiotics. These antibiotics are commenced empirically, immediately, in patients with puerperal sepsis, while the result of microscopy, culture and sensitivity is being awaited. This practice helps to mitigate morbidity and mortality from puerperal sepsis. Our study differed from the 4.1% maternal mortality rate reported in Ile-Ife [11], 15.1% in Sokoto [10], and 30.9% in Uganda [31]. There were two (3.0%) cases of perinatal mortality in our study. The two babies may have died from overwhelming sepsis complicating chorioamnionitis, or from birth asphyxia, since they were delivered at the TBAs', by unskilled personnel, and in unsterile environments. The placenta and foetal membranes were discarded prior to presentation to our facility; therefore, the foetal membranes could not be cultured to make a definitive diagnosis of chorioamnionitis.

5. CONCLUSION

Puerperal sepsis remains an important public health problem in developing countries. While encouraging antenatal care and supervised hospital delivery is important for its primary prevention, early diagnosis, prompt and effective antibiotic and supportive therapy will prevent its complications.

6. LIMITATION

This study is limited by the fact that it is a single centre, hospital-based study, and may therefore, not reflect what is obtainable in other institutions in our sub-region.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

This research work was examined and approved by the hospital Research and Ethics Committee.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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