

Research Article**PUERPERAL SEPSIS: MICROBACTERIAL ISOLATES, SENSITIVITY AND MATERNAL OUTCOME AT A TERTIARY HEALTHCARE FACILITY IN NIGERIA**

¹Benson, Azibato Benjamin, ¹Atemie, Gordon, ^{1,*}Ozori, Ebiogbo Stanley, ¹Okpara, Abuchi Loveday, ¹Oyeyemi, Nuvie, ¹Agbagoro, Oghenetega Jesse, ¹Okoko, Fiafiata Tamarapreye and ²Usman, Malgwi Justina

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

²Department of Obstetrics and Gynaecology, Maitama District Hospital Abuja, Nigeria

Received 14th December 2022; Accepted 11th January 2023; Published online 17th February 2023

Abstract

Puerperal sepsis, an infection of the genital tract following childbirth is one of the leading causes of maternal morbidity and mortality. It is the third leading cause of direct maternal mortality in developing nations. This study was aimed at determining the prevalence of puerperal sepsis, socio-demographic characteristics, organisms and sensitivity pattern as well as morbidity and mortality associated with puerperal sepsis at the Obstetrics and Gynaecology department of the Federal Medical Centre, Yenagoa, Bayelsa, Nigeria. It was a descriptive cross sectional study. There were 2375 deliveries during the study period under which there were 33 cases of puerperal sepsis. This gave a prevalence of 1.4%. The modal parity was 1 and 69.7% of the women had no antenatal care. Fever (33%) was the most common presenting complaint. Majority (63.6%) of the patients delivered at home. About 93.9% of the patients had spontaneous vaginal delivery while 6.1% had caesarean sections. Only 1 (3%) of the client lost her baby. The most common organism cultured was *Escherichia coli* (24.2%). The organisms isolated were most sensitive to Ceftriaxone (57.2%). Anaemia (11.9%) was the most common complication among the patients. There was no maternal mortality. The prevalence of puerperal sepsis in this study was low, compared with the incidence in other centres in Nigeria. Most of the women were unbooked and primiparous. Majority of the women did not have any complication. Culture and sensitivity of causative organisms is needed for individualized treatment. There was no maternal mortality during the study period.

Keywords: Puerperium, sepsis, bacteria, sensitivity, outcome.

INTRODUCTION

Genital tract infection following delivery is referred to as puerperal sepsis and is synonymous with older descriptions of puerperal fever, milk fever and childbed fever (Weeks, 2017). Puerperal sepsis is one of the major causes of maternal morbidity and mortality especially in developing countries (WHO, 2012; Ngonzi *et al.*, 2016; Oranu *et al.*, 2020). The WHO reported 358,000 maternal mortality yearly and 15% of this is associated with puerperal sepsis (WHO, 2012). Puerperal sepsis is defined as infection of the genital tract occurring at any time between the rupture of membranes or labour and the 42nd day postpartum in which two or more of the following are present: pelvic pain, fever (oral temperature 38.5°C or higher on any occasion), abnormal vaginal discharge, abnormal smell or delay in the rate of reduction in the size of the uterus (less than 2 cm per day during the first eight days) (Sulaiman *et al.*, 2018). Common risk factors include underlying conditions such as obesity, diabetes, human immunodeficiency virus (HIV). Chorioamnionitis, prolonged rupture of membranes, cervical cerclage for cervical incompetence during the antenatal period and during the intrapartum period, prolonged labour, multiple vaginal examinations, instrumental delivery, caesarean section, manual removal of the placenta, and retained products of conception are all predisposing factors (Ononuju *et al.*, 2015; Demisse *et al.*, 2019). Variety of bacterial pathogens have been implicated in puerperal sepsis including wide range of anaerobes

(like *Peptostreptococcus*, *Clostridium spp*, *Pseudomonas* and *Bacteroides fragilis*) and facultative aerobes (such as *Escherichia coli*, *Enterococci spp*, *Klebsiella spp*, beta-haemolytic *Streptococci* and *Staphylococci*) (Weeks, 2017; WHO, 2012; Raymond *et al.*, 2019; Tamboli *et al.*, 2017). The antimicrobial susceptibility patterns of causative agents of puerperal sepsis differ widely across geographic areas and with time (Raymond *et al.*, 2019; Manyahi *et al.*, 2014). There are a number of factors that determine the clinical course and severity of the infection, namely the general health and resistance of the woman, the virulence of the offending organism, the presence of haematoma or retained products of conception, the timing of antibiotic therapy and associated risk factors (Weeks, 2017; Raymond *et al.*, 2019; Tamboli *et al.*, 2017). An ascending infection from the lower genital tract or primary infection of the placental site may spread via the Fallopian tubes to the ovaries, giving rise to a salpingo-oophoritis and pelvic peritonitis. This could progress to generalized peritonitis and the development of pelvic abscesses. Common clinical features (aside from aforementioned fever, lower abdominal pain, foul-smelling vaginal discharge and sub-involuted uterus) are malaise, headache, nausea, vomiting. It is important to examine episiotomy or caesarean section wound to rule out infection. Clinical features suggestive of formation of a pelvic abscess include high-grade fever, tenderness and or rigidity in the lower abdomen, boggy or tender fluctuant mass in the pouch of Douglas (Bonet *et al.*, 2015; RCOG, 2022). Certain investigations such as full blood count, peripheral blood film, urine microscopy, culture and sensitivity, high vaginal or endocervical swab, ultrasound scan to rule out retained

*Corresponding Author: Ozori Ebiogbo, S.,

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

products are done. Other investigations that can be done depending on the clinical scenario include blood culture and x-ray of the abdomen/pelvis (Weeks, 2017; Oranu *et al.*, 2020; Sulaiman *et al.*, 2018; Raymond *et al.*, 2019). The management of puerperal sepsis involves early recognition, aggressive resuscitation, antibiotic administration and source control (RCOG, 2012). The mainstay of treatments for these patients is the use of antibiotics with good coverage for implicated organisms. Patients with moderate to severe infection should be treated with parenteral antibiotics while those with mild infection can be given oral medications (Oranu *et al.*, 2020; Raymond *et al.*, 2019). Other specific treatments might involve laparotomy and drainage of a pelvic abscess in massive pelvic collection (Weeks, 2017; Oranu *et al.*, 2020; Ononuju *et al.*, 2015). The complications of puerperal sepsis include anaemia, pelvic abscess, septicaemia, septic pelvic thrombophlebitis, disseminated intravascular coagulopathy. Late complications such as infertility, ectopic pregnancy and intestinal obstruction might arise (Oranu *et al.*, 2020; Raymond *et al.*, 2019). Early diagnosis and treatment are imperative if the long term sequelae are to be avoided. This study is justified for the following reasons to have a published documented incidence of puerperal sepsis and its complication in the facility, as there has not been one. Secondly, guide antibiotics administration when managing puerperal sepsis in the locale where we practice. Since the implicated organisms responsible for puerperal sepsis varies between localities. This study was aimed at determining the prevalence of puerperal sepsis, socio-demographic characteristics, organisms and sensitivity pattern as well as morbidity and mortality associated with puerperal sepsis at the Federal Medical Centre, Yenagoa, Bayelsa, Nigeria.

METHODOLOGY

This descriptive cross sectional study covered a period of four (4) years, from the 1st of January, 2018 to the 1st of January, 2021 in the department of Obstetrics and Gynaecology at the Obstetrics and Gynaecology department of the Federal Medical Centre, Yenagoa, Bayelsa, Nigeria. It is a tertiary care centre that gets referrals from peripheral hospitals in Bayelsa state and some nearby areas of Rivers and Delta states. Puerperal sepsis cases were traced through the records kept in the postnatal ward, labour ward, operating theatre and the gynaecology emergency records. A total of thirty-three patient's folders were retrieved and information collected using a proforma. The information fetched were the sociodemographic characteristics of the study subject, their presenting symptoms and duration, peripartum events, bacterial isolates and sensitivity pattern, as well as complication from puerperal sepsis. The data extracted were entered in IBM SPSS version 25, analysed, and presented using percentages and graphs.

RESULTS

Sociodemographic characteristics of study subjects

There were 2375 deliveries during the study period of which there were 33 cases of puerperal sepsis. This gave a prevalence of 1.4%. The ages of the patients ranged from 16-39 years and the mean age was 27.2 years, (Table 1). Three out of every five patient had secondary level of education (60.6%) and slightly above two third of affected patients were booked for antenatal

care, (30.3%) (Table 1). Primiparous women were most affected by puerperal sepsis (39.4%), (Table 1).

Clinical features of study subjects

As depicted in the Figure 1, fever (33%) was the most common presenting complaint, followed by abdominal pain (32%) and abnormal vaginal discharge (31%).

Duration of study subjects' symptoms

As shown in table 2, the highest number of patients presented within 15-21 days of development of symptoms (39.3%). About 15.2% presented within the first 7 days and more than 21 days of onset of symptoms.

Peripartum events of the study subjects

As displayed in Table 3, majority (63.6%) of the patients delivered at home and the accoucheur were traditional birth attendant (63.6%). About 9 out of every 10 patients had spontaneous vaginal delivery, (93.9%). About 4 (12.1%) of the patients had premature rupture of fetal membranes while 87.9% did not have premature rupture of fetal membranes. Only 1(3%) of the client lost her baby.

Bacteria isolates and sensitivity pattern in the study subjects with puerperal sepsis

Table 4 shows that about two patients (6.1%) did not have endocervical swab for microbiological study done and in those that had it done, the most common organism cultured was *Escherichia coli* (24.2%). No bacterial growth on culture was seen in more than half study subjects (51.5%). The organisms isolated were mostly sensitive to Ceftriaxone (57.2%), followed by Gentamicin (28.6%).

Complications of puerperal sepsis among study subjects

Table 5 shows that 64.3% had no complication of puerperal sepsis. It was found out that anaemia constituted was the commonest complication among the patients (11.9%) seconded by septicaemia (7.1%). There was no maternal mortality.

Table 1. Socio-demographic characteristics of study subjects

Age (Years)		
15-1	3	9.1
20-24	10	30.3
25-29	7	21.2
30-34	9	27.3
35-39	4	12.1
Total	33	100
Educational Status		
Primary	1	3.0
Secondary	20	60.6
Tertiary	12	36.4
TOTAL	33	100
Booking Status		
Booked	10	30.3
Unbooked	23	69.7
Total	33	100
Parity		
1	13	39.4
2	11	33.3
3	2	6.1
4	4	12.1
≥5	3	9.1
Total	33	100

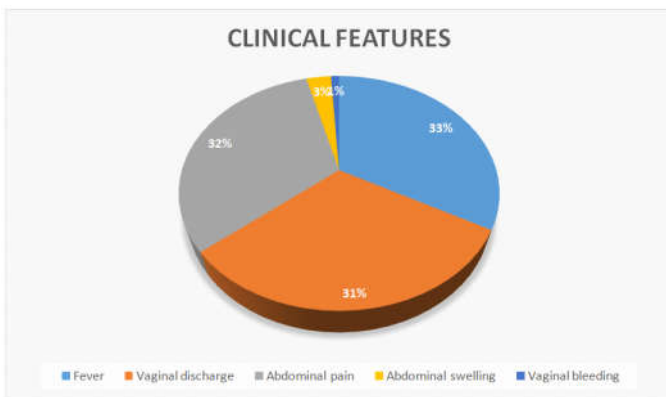


Figure 1. Presenting complaints

Table 2. Duration of study subjects' symptoms

Parameter	Frequency	Percentage
1-7 days	5	15.2
8-14 days	10	30.3
15-21 days	13	39.3
>21 days	5	15.2

Table 3. Events related to the delivery

Parameter	Frequency	Percentage
Place of delivery		
Home	21	63.6
Hospital	12	36.4
Accoucheur		
Traditional birth attendant	21	63.6
Midwife/Nurse	10	30.3
Doctor	2	6.1
Mode of delivery		
SVD	31	93.9
Caesarean section	2	6.1

SVD: Spontaneous vaginal delivery

Table 4. Bacteria isolates and sensitivity pattern in the study subjects with puerperal sepsis

Parameter	Frequency	Percentage
Bacterial isolate		
No sample for bacteriology	2	6.1
No growth	17	51.5
<i>Escherichia coli</i>	8	24.2
Mixed growth	2	6.1
<i>Staphylococcus aureus</i>	4	12.1
Sensitivity pattern		
Ceftriaxone	8	57.2
Ofloxacin	1	7.1
Gentamicin	4	28.6
Amoxicillin	1	7.1
Resistant to all	-	-

Table 5. Complications of puerperal sepsis among study subjects

Complications	Frequency	Percentage
No complication	27	64.3
Death	-	-
Anaemia	5	11.9
Abscess collection	2	4.8
Septicaemia	3	7.1
Psychosis	1	2.4

DISCUSSION

The mean age of the patients studied was 27.2 years. Child bearing in the Southern part of Nigeria occurs at a young age from our observation. The reason for this is noticed to stem from the unmet needs of family planning, outright morbid fear for contraception, cultural/religious stigmatization of young

women wanting to access family planning methods and poverty forcing young women to be unable to negotiate protected sexual intercourse. The prevalence of puerperal sepsis was highest among the age group of 20 – 24 years. This again is linked to poverty and poor/insufficient formal education in this age group, which hinders their access to skilled antenatal, intrapartum and postpartum care. A significant number of the study subjects (60.6%) had secondary level of education and this was in keeping with a similar study done in Port Harcourt (Ononuju *et al.*, 2015). About 69.7% were unbooked for antenatal care and agrees with other similar studies in Nigeria (Oranu *et al.*, 2020; Ononuju *et al.*, 2015) and being unbooked may have increased the risk of puerperal sepsis in these women. Above one third of the patients (39.4%) were primiparous, which was similar to other studies in Rivers State University Teaching Hospital (Ononuju *et al.*, 2015), Usmanu Danfodiyo University Teaching Hospital (Sulaiman *et al.*, 2018) and University of Port Harcourt Teaching Hospital (Ononuju *et al.*, 2015). This may be due to the fact that they were first timer pregnant women and were usually prone to difficult or prolonged labour and lacked experience of postpartum care.

The prevalence of puerperal sepsis from this study was 1.4%, which was in keeping with 1.7% recorded in a study done in Port Harcourt (Oranu *et al.*, 2020). It was higher than 0.78% recorded in a study done in Maiduguri (Bako *et al.*, 2012). However, it was lower than 16.7% documented in a similar study done in Jos (Mutahir *et al.*, 2011). This may be due to the disparity in demographic profiles and geographical areas. Fever was the commonest presentation (33%) and there was history of rupture of membranes in 12.1% of the patients which was similar to other studies (Oranu *et al.*, 2020; Sulaiman *et al.*, 2018; Ononuju *et al.*, 2015). Above one of the women (39.3%) presented between 15 - 21 days of onset of symptoms which was in contrast to a study done by Suleiman *et al.* (2018). Early presentation may aid early treatment and prevention of complications from puerperal sepsis.

Slightly above three-fifth of the study subjects (63.6%) had unsupervised home/Traditional Birth Attendant's deliveries and this was in keeping with similar studies done in Port Harcourt (Oranu *et al.*, 2020; Ononuju *et al.*, 2015). This may be due to the cultural beliefs and practices of the communities where these patients resided. Asepsis is not guaranteed outside the hospital setting and delivery by an unskilled personnel increases the risk for puerperal sepsis. Majority (93.9%) of the patients had a spontaneous vaginal delivery while 6.1% had emergency caesarean sections and this was similar to studies done in Sokoto (Sulaiman *et al.*, 2018). About 3% of the study subjects had neonatal deaths, which was significantly lower than figures reported from other centres (Sulaiman *et al.*, 2018). During an unsupervised vaginal delivery, there is an increased risk of genital tract infection due to unconventional practices and as such, the neonate is exposed to the risk of neonatal sepsis and death. Only 6.1% of the patients did not have endocervical swab samples taken for microscopy, culture and sensitivity. Interestingly, among those that had their samples taken for culture and sensitivity, slightly more than half (51.5%) had no growth from the culture. The organism cultured most was *Escherichia coli* (24.2%), followed by *Staphylococcus aureus* (12.1%) and mixed isolates (6.1%). This finding was coherent with studies done by Vanukuru *et al.* (Bako *et al.*, 2012). Collectively, these studies showed variations in aetiology of puerperal sepsis (Mutahir and Utoo,

2011; Qadri *et al.*, 2015). The explanation for this could be due to differences in the demographic and clinical characteristics of the patients such as; age, immune status or underlying conditions as well as variations in bacteriological techniques used in sample collection and culture of the bacteria (Majangara *et al.*, 2018). The few organisms cultured in this study could be due to a possible paucity of culture media during the study period. Another possible explanation could be prior use of over the counter antibiotics by the patients. Ceftriaxone (57.2%) was the most sensitive antibiotic from the study followed by Gentamycin (28.6%). Both drugs can be safely given to breastfeeding women. A good number of the patients (64.3%) had no complications from puerperal sepsis, while anaemia (11.9%) was the commonest complication observed from this study. There was no maternal mortality during the study period. This may be due to the prompt emergency services offered by the facility and also the increased patronage of the Health Insurance Scheme in the state which boycotts the financial barriers to providing medication and other obstetric services.

Conclusion

The prevalence of puerperal sepsis in our facility is low. A significant number of the affected women were unbooked and primiparous who had unsupervised home deliveries. The most common organism isolated was *Escherichia coli* and this organism was most sensitive to Ceftriaxone.

Limitations

Being a hospital based study, it may not reflect what happens in the general population as some of the affected patients do not access the tertiary institution. Therefore a community based study will be more accurate as this will help determine the actual incidence and sensitivity pattern of puerperal sepsis. Limited culture media available in our centre could account for the few organisms cultured during the study period.

Recommendations

Community health education and girl child education will improve the health seeking behaviour in this environment. In addition poverty alleviation and health insurance will make health care affordable. Safe delivery practices at primary health centres by trained birth attendants and twenty four hour full laboratory services every day of the week will go a long way in prevention of this dreaded maternal malady.

REFERENCES

- Atlaw D, Seyoum K, Woldeyohannes D, Berta M. Puerperal sepsis and its associated factors among mothers in University of Gondar referral hospital, Ethiopia, 2017. *Int J Pregnancy Child Birth*. 2019; 5(5): 190 - 195.
- Bako B, Audu BM, Lawan ZM, Umar JB. Risk factors and microbial isolates of puerperal sepsis at the University of Maiduguri Teaching Hospital, Maiduguri, North-eastern Nigeria. *Arch Gynaecol Obstet*. 2012; 285(4): 917 - 927.
- Bonet M, Oladapo OT, Khan DN, Mathai M, Gülmezoglu AM. New WHO guidance on prevention and treatment of maternal peripartum infections. *Lancet Glob Health*. 2015; 3: 667 - 668.
- Demisse GA, Sifer SD, Kedir B. Determinants of puerperal sepsis among post-partum women at public hospitals in west SHOA zone Oromia regional STATE, Ethiopia (institution based case control study). *BMC Pregnancy Childbirth*. 2019;19: 95.
- Majangara R, Gidiri MF, Chirenje ZM. Microbiology and clinical outcomes of puerperal sepsis: a prospective cohort study. *J Obstet Gynaecol*. 2018; 38(5): 635 – 41.
- Manyahi J, Matee MI, Majigo M, Moyo S, Mshana SE, Lyamuya EF. Predominance of multi-drug resistant bacterial pathogens causing surgical site infections in Muhimbili National Hospital, Tanzania. *BMC Res Notes*. 2014; 7:500.
- Mutihir JT, Utoo BT. Postpartum maternal morbidity in Jos, North central Nigeria. *Niger J Clin Pract*. 2011; 14: 38 - 42.
- Ngonzi J, Tornes YF, Mukasa PK, Salongo W, Kabakyenga J, Sezalio M. Puerperal sepsis, the leading cause of maternal deaths at a Tertiary University Teaching Hospital in Uganda. *BMC Pregnancy Childbirth*. 2016; 16: 207 - 300.
- Ononuju CN, Nyengidiki TK, Ugboma HAA, Bassey G. Risk Factors and Antibigram of organisms causing sepsis in a tertiary health facility in Nigeria. *Trop J Obstet Gynaecol*. 2015; 32(2): 73 - 82.
- Oranu EO, Owolabi AO, Nonye-Enyindah EI. Revisiting Puerperal Sepsis in Obstetric Referral Centres in Port Harcourt, Southern Nigeria. *J Adv Med Res*. 2020; 32(5): 9 - 15.
- Qadri S, Sharma K, Siddiqui B, Ehsan A, Sherwani RK, Sultan A, Khan F. Microbial profile in females with puerperal sepsis: a major threat to women's health: study at a tertiary health care centre. *Int J Curr Microbiol App Sci*. 2015; 1: 248 – 55.
- Raymond K, Belinda B, Mtebe VM, Mecky M. Laboratory confirmed puerperal sepsis in a national referral hospital in Tanzania: aetiological agents and their susceptibility to commonly prescribed antibiotics. *BMC Infect. Dis*. 2019; 19: 690.
- RCOG. Sepsis following Pregnancy, Bacterial (Green-top Guideline No. 64b) 2012. Available: <https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg64b/>. Accessed 11 July 2022
- Sulaiman B, Tunau KA, Nasir S, Hassan M, Ahmed Y. Puerperal Sepsis At Usmanu Danfodiyo University Teaching Hospital, Sokoto: A Ten Year Review. *European J Pharm Med Res*. 2018; 5(4): 569 - 573.
- Tamboli SS, Tamboli BS, Shrikhande S. Puerperal sepsis: predominant organisms and their antibiotic sensitivity pattern. *Int J Reprod Contracept Obstet Gynecol*. 2017; 5(3):762 - 765.
- Weeks AD. The puerperium. In: Kenny CL, Myers JE, editors. *Obstetrics by Ten Teachers*. 20th edition. CRC Press; 2017; 273 - 296.
- WHO Trends in maternal mortality: 1990 to 2015. WHO. Available: <http://www.who.int/reproductivehealth/publications/monitoring/maternalmortality-2015/en/>. Accessed 04 July 2022.