PUERPERAL SEPSIS AT UNIVERSITY COLLEGE HOSPITAL, IBADAN: A 10-YEAR REVIEW

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ABSTRACT

Background: **Puerperal sepsis is one of the leading causes of pregnancy-related maternal morbidity and mortality in developing countries. This study explored the complications, treatment modalities, and management outcomes of puerperal sepsis.**

Methods: **A 10-year retrospective review of women managed for puerperal sepsis at University College Hospital, Ibadan, Nigeria between January 2009 and December 2018. Information on their socio-demographic and obstetrics characteristics, presenting complaints, treatment modalities, complications, and outcomes were obtained from the medical records. Data was analyzed with SPSS version 20. Descriptive statistics was done and results were presented in tables and chart.**

Results: **The prevalence of puerperal sepsis during the period reviewed was 0.83%. The mean age of the women was 29.0±6.7 years. The primiparous women 53(33.5%) were mostly affected. *Klebsiella spp* 25(15.8%) was the most common organism isolated and most sensitive to the third generation of Cephalosporin and Quinolones. Anaemia 90(56.8%) was the most common complication and all the women had intravenous antibiotics while about half (46.5%) of those with abdominopelvic collections were managed surgically via laparotomy. The case fatality rate was 16.5%.**

Conclusion: **Despite the low prevalence of puerperal sepsis within the period reviewed, a high case fatality was recorded. Cephalosporin and Quinolones should be considered in managing puerperal sepsis in our facility but more importantly prevention of maternal sepsis is essential.**

INTRODUCTION

It is a known fact that childbirth is a life-changing event associated with joy however, it can be a difficult period, bringing with it new problems like puerperal sepsis.[1] The World Health Organization (WHO) defined puerperal sepsis as an infection of the genital tract occurring at any time between rupture of a membrane or labour and 42nd day postpartum in which two or more of the following are present; pelvic pain, fever (temperature ≥38.5°C on any occasion), abnormal vaginal discharge, delay in the rate of uterine involution (< 2cm/day in first 8 days postpartum).[2]

Puerperal sepsis has historically been a common pregnancy-related complication associated with obstetric shock and maternal death.[3,4] With the current maternal mortality ratio of 512 maternal deaths per 100,000 live births, Nigeria still has one of the highest ratios of maternal mortality in the world.[5] It was reported by the WHO that Nigeria did not achieve the MDG goal-5 that sought to reduce maternal mortality by 75% by 2015, on the contrary, there was a substantial increase in maternal death.[2,6] Along with pre-eclampsia and obstetric hemorrhage, puerperal sepsis had formed the lethal triad of causes for maternal morbidity and mortality.[7,8]

Annually, over 5 million cases of puerperal sepsis occur globally, with an estimated 75,000 maternal deaths and mortality rates attributable to sepsis estimated at 33% in low-income countries.[9] It is difficult to establish the exact incidence in developing countries largely due to under-reporting and discrepancies in diagnostic criteria. Studies from Sokoto, North-West Nigeria, and Port-Harcourt, South-South Nigeria reported incidences of 0.9% and 9.34% respectively.[1,10] In Jos, North-Central Nigeria, puerperal sepsis accounted for 16.7% of postpartum morbidities.[11] Puerperal sepsis also contributed to 1.3% of maternal mortality in Ogbomosho and 0.9% of maternal complications in Ibadan, Southwestern Nigeria.[12,13]

An unhygienic home delivery which is a common practice in Nigeria increases the incidence of puerperal sepsis.[14] Other risk factors include diabetes mellitus, anaemia, retained placenta, human immunodeficiency virus, low socioeconomic status, frequent vaginal examinations, and prolonged rupture of membranes.[15] Meanwhile, puerperal sepsis is a preventable condition with the standard practice of good antenatal care, aseptic delivery practices, and proper postpartum care.[14] Once diagnosed, delay or inadequate treatment will result in a rapid progression to endotoxic shock, peritonitis, abscess formation, generalized sepsis, and death. Long-term complications of secondary infertility and chronic disabilities are also associated with this condition. It is thus imperative that health facilities identify the specific causative organisms causing puerperal sepsis in their locality and determine their microbiologic pattern to eliminate the prescription of antibiotics to which the organisms are not sensitive to, to avoid prolonged recovery time, and high cost of therapy. Therefore, our study's outcome will guide the management of puerperal sepsis and the development of the local protocol.

MATERIALS AND METHODS
This was a 10-year retrospective review of women with puerperal sepsis managed at University College Hospital (UCH), Ibadan, Nigeria between January 2009 and December 2018. UCH is a tertiary health institution which serves as a referral center for private, primary and secondary health facilities. Medical data of all women who were diagnosed to have puerperal sepsis based on the symptoms and signs, and managed for it during the study period, were retrieved from the emergency room, postnatal ward, and operating theatre register. The registers also provided information on the total number of admissions and deliveries.

Information on the women's socio-demographic and obstetrics characteristics, presenting complaints, treatment modalities, microbiology results, complications and management outcomes were retrieved from their medical records using a structured pro forma.

For this study, all women managed for puerperal sepsis based on the symptoms, signs and/or laboratory evidence of puerperal sepsis at presentation, during admission but within 42 days postpartum period was included. Puerperal sepsis is defined as an infection of the genital tract occurring at any time between rupture of membrane or labour and 42 days postpartum in which two or more of the following are present; pelvic pain, fever (temperature ≥ 38.5oC on any occasion), abnormal vaginal discharge, delay in the rate of uterine involution.

In this study, booked woman refers to a woman who registered and had antenatal care services in the health facility of study while unbooked are those who did not receive antenatal care services there. Primiparous refers to woman who had carried a pregnancy and delivered at or greater than 28 weeks gestation for the first time.

Premature rupture of membrane (PROM) is defined as rupture of membrane before the onset of labor.

Data obtained were entered and analyzed using the SPSS version 20. Descriptive statistics was done; frequencies, mean, standard deviation and range were analyzed while results were presented in tables and chart.

RESULTS
A total of 22,049 deliveries and 184 cases of puerperal sepsis were recorded during the study period. Of these 184 cases, 159 medical records were retrieved with a retrieval rate of 86%. However, 158 of the cases that met the WHO criteria for puerperal sepsis were analyzed with a prevalence of 0.83%. The mean age of the women was 29.0± 6.7 years with ages ranging between 16-47 years. A higher proportion 52(32.9%) were in the 26-30 years age group and the majority 147(93.0%) were married and self-employed

Table 1: Socio-demographic characteristics

Characteristics	Frequency (n=158)	Percentage (%)
Age(years)		
16-20	22	13.9
21-25	26	16.5
26-30	52	32.9
31-35	26	16.5
36-40	26	16.5
41-45	4	2.5
>45	2	1.2
Range= 16-47		
Mean±SD= 29.0±6.7		
Educational status		
No formal	20	12.7
Primary	66	41.8
Secondary	50	31.6
Tertiary	22	13.9
Occupation		
Civil servant	15	9.5
House wife	16	10.1
Self employed	111	70.3
Schooling	16	10.1
Marital status		
Married	147	93.0
Single	8	5.1
Separated	3	1.9

111(70.3%) while 66 (41.8%) had only primary education (Table 1).

About one-third 61(38.6%) were primiparous. Compared to booked patients 8(5.7%), puerperal sepsis occurred majorly 149(94.3%) among the unbooked who were either referred to the health facility during labour or after delivery and 46(29.1%) of them delivered at a non-health facility. Among the 112(70.9%) who delivered at health facilities, 40(37.5%) delivered at the secondary health facilities while 40(35.7%) and 30(26.8%) did at tertiary and primary health facilities respectively. Majority 126(79.7%) had term delivery, 96(60.8%) had spontaneous vaginal delivery while 56(35.4%) had premature rupture of membrane (PROM). (Table 2).

Most of the women presented with multiple symptoms and the three typical symptoms were fever 143(90.5%), abnormal vaginal discharge 93(58.5%) and

Table 2: Obstetric characteristics

Variables	Frequency(n=158)	Percentage (%)
Parity		
1	61	38.6
2	34	21.5
3	32	20.2
4	11	7.0
5	12	7.6
>5	8	5.1
Booking status		
Booked	8	5.1
Unbooked	149	94.3
Missing	1	0.6
Place of delivery		
Health facility	112	70.9
Non health facility	46	29.1
First point of care of patients that delivered in Health facility (n=112)		
Health facility	24	21.4
Non health facility	88	78.6
Level of Health facility(n=112)		
Primary	30	26.8
Secondary	42	37.5
Tertiary	40	35.7
Gestational age		
Preterm (< 37 weeks)	28	17.8
Term (> 37 weeks)	126	79.7
Post term (> 40 weeks)	4	2.5
PROM		
Yes	56	35.4
No	102	64.6
Accoucheur		
CHEW	28	17.7
Doctor	81	51.3
Nurse/Midwife	3	1.9
Relation/Neighbour	19	12.0
TBA	27	17.1
Mode of delivery		
EMLSCS	57	36.1
ELLSCS	5	3.1
SVD	96	60.8
Place of delivery		
Labour room	46	29.1
Operating Theatre	62	39.3
Emergency room	4	2.5
Home	36	22.8
Church/Mission home	10	6.3

CHEW: Community Health extension worker, PROM: Premature rupture of membrane, TBA: Traditional birth attendant, EMLSCS: Emergency lower segment cesarean section, ELLSCS: Elective lower segment cesarean section, SVD: Spontaneous vaginal delivery.
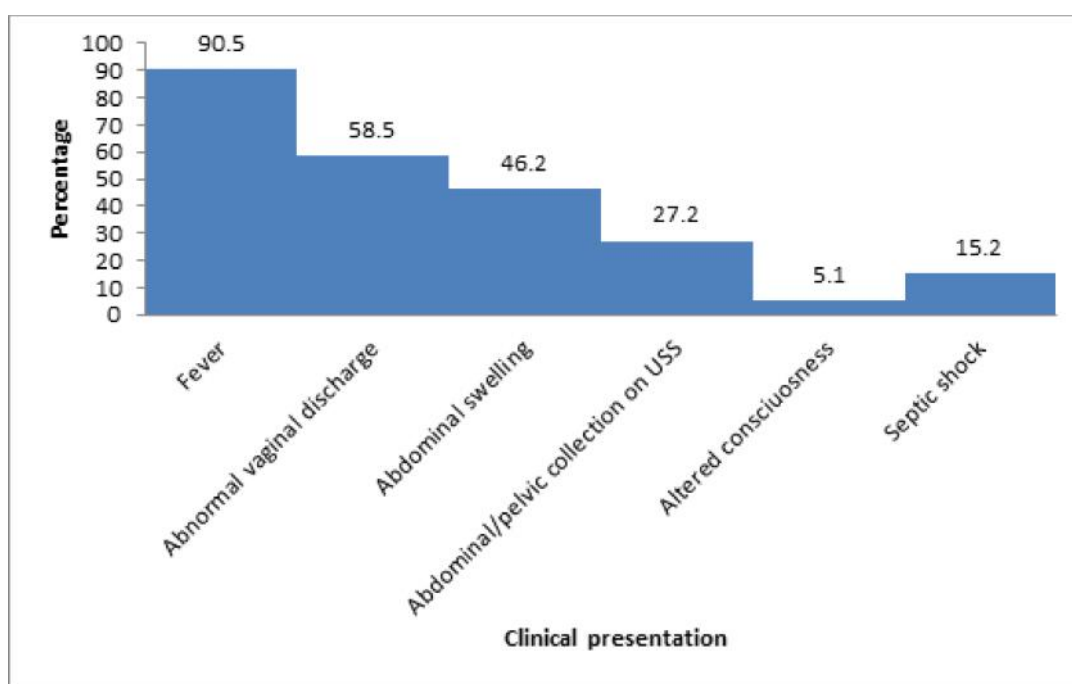
Figure 1: Clinical presentation of the patients (Patients presented with multiple complaints)

abdominal swelling 73(46.2%), (Fig 1). Also, symptoms were developed in the majority 130(82.2%) of the women in the first week of puerperium. The mean onset of symptoms before presenting at the health facility was 4.3(SD=3.6) days while the mean duration of symptoms at presentation was 10.3 (SD=10.1) days. The average time on admission was 18.1 ± 15.8 days and the range was a few hours to 90 days (Table 3).

While 69(43.7%) of the women had no endocervical swab for microbial culture, there was no growth in 32(20.3%) of the samples collected. *Klebsiella spp* was the most common organism 25(15.8%) followed by *Escherichia spp* 12(7.6%) isolated in the patients. These species were most sensitive to ceftazidine, ceftriaxone, ofloxacin, ciprofloxacin and amikacin (Table 4).

Table 3: Clinical characteristics of the women with puerperal sepsis

Parameter	Frequency	Percentage (%)
Onset of symptoms (days postpartum)		
< 1	12	7.6
1-7	130	82.2
8-14	12	7.6
15-21	2	1.3
>21	2	1,3
Mean ± SD = 4.3 ± 3.6		
Range= 1-26		
Duration of Symptoms before presentation (days)		
< 1		
1-7	9	5.7
8-14	90	57.0
15-28	35	22.1
>28	12	7.6
Mean ± SD = 10.3 ± 10.1	12	7.6
Duration of hospital stay after presenting at the health facility (days)		
< 1	4	2.5
1-7	48	30.4
8-14	31	19.6
15-28	24	15.2
29-59	20	12.7
>60	31	19.6
Mean ± SD = 18.1 ± 15.8		

Table 4: Bacteria isolates and rates (%) of antibiotic sensitivity pattern in women with puerperal sepsis

Parameter	Frequency	Percentage(%)
Bacteria Isolate		
Not performed	69	43.7
No growth	32	20.3
Klebsiella spp	25	15.8
Escherichia spp	12	7.6
Mixed growth	9	5.8
Proteus spp	3	1.9
Streptococcus	2	1.3
Staphylococcus spp	4	2.4
Pseudomonas spp	1	0.6
Acinobacter Baumani	1	0.6
Antibiotic sensitivity pattern of most frequently isolate organism (%)		
Antibiotics/ Isolates	**Klebsiella spp**	**Escherichia Coli**
Ceftazidine	100	100
Ceftriaxone	100	100
Amoxycillin/Clavulanic	92.5	88.8
Ofloxacin	100	100
Ciprofloxacin	100	100
Gentamycin	97.1	98.4
Amikacin	100	100

Regarding treatment, all the women had intravenous antibiotics and 20(46.5%) out of the 43 who had abdominopelvic collections on ultrasound scan had laparotomy performed. Anaemia was the commonest complication 90(56.8%) while 61(38.6%) of the women had no complications. Maternal mortality occurred in 26(16.4%) of the women studied (Table 5).

Maiduguri.[15] This is however lower than 1.3% reported in Ogbomoso, 3.59% in Lagos, 1.7% in Port-Harcourt, and 1.7% and 3.89% reported in Pakistan.[7,12,16-18]

The prevalence was likewise higher among women in the 26-30 years age group. This is similar to the study from Port-Harcourt and Maiduguri[10,15] though a similar study reported a lower age of <25 years in

Table 5: Complications and management outcomes of puerperal sepsis among participants

Variable	Frequency	Percentage (%)
Treatment instituted		
Intravenous Antibiotics	158	100.0
Intravenous Antibiotics + Laparotomy (n=43)**	20	46.5
Complications		
Acute Kidney Injury	13	8.3
Anaemia	90	56.8
Psychosis	5	3.2
Multiple organ dysfunction syndrome	32	20.3
None	61	38.6
Outcomes of management		
Mortality	26	16.5
Discharged Home	117	74.1
Discharge against medical advice	15	9.5

*** = Women with significant abdominal/pelvic collection on scan*

DISCUSSION

Puerperal sepsis is a preventable cause of maternal mortality that is still prevalent in Nigeria. The 2018 Nigerian demographic and health survey found facility deliveries rate of 61-77% in Oyo State, Southwestern Nigeria whose capital is "Ibadan" where the study location is situated.[5]

The 0.83% prevalence of puerperal sepsis found in this study is comparable to the 0.78% reported in

Bangladesh.[19] Generally, the women reviewed mainly had secondary or lower educational status and were self-employed, married and primiparous. The link between educational level, ignorance and poverty cannot be overlooked in a nation. A higher level of education tends to positively affect health behaviours and may increase a woman's control over her pregnancy, thereby enabling her to recognize danger signs and complications and take appropriate action.[20,21]

Ignorance and poverty affect cultural practices, health-seeking behavior and early presentation when complications develop. This may also explain the low level of utilization of health facilities as a point of first care at the onset of labour among those that eventually delivered in a health facility found in the study. This is reflected in the fact that the majority of these women were mainly unbooked and had a low level of education.

Furthermore, it was shown that primiparous women constituted the majority of those with puerperal sepsis. This is in keeping with findings in Lagos, Sokoto, and Pakistan where puerperal sepsis was also seen mainly among primiparous women[1,7,16] but in contrast to the report from Jos where the women with puerperal sepsis were mainly multiparous. This may be because primigravidas might take a long course of labour and trials in various unskilled hands before reaching a health facility.[7] All these are likely to increase their risks of pregnancy-related morbidity and even mortality.

There was a higher 93.4% prevalence of puerperal sepsis among unbooked patients and this finding is in keeping with several studies.[1,15,16,18] It is expected that unbooked patients would not benefit from antenatal care, continuous education on nutrition, hygiene, birth preparedness, recognition of danger signs and when to present to a health facility. Also, the lack of access to qualitative and quantitative information may explain the women's delayed presentation shown in our study. Notably, 78.6% of the unbooked women who delivered in a health facility had their first point of care in a non-health facility. This result is substantiated by the most recent NDHS with only 39% of women delivering in a health facility.[5] This might not be unrelated to the women's low socioeconomic status and proximity to the health facility as documented by previous studies.[22-24] Moreover, more than a quarter of the women reviewed delivered in a non-health facility. Though, a much higher proportion (73.6%) of the women who were reviewed in a Pakistan study did not deliver in the health facility compared with the present study.[18] Delivering in a non-health facility increases the risk of introducing organisms into the genital tract as a standard aseptic process may not be adhered to. There is also an increased risk of poor labour supervision because the majority of persons who take delivery in such settings are usually unskilled birth attendants. Poor aseptic techniques and the use of contaminated instruments are recognized factors that predispose women to infection during delivery.[26,27] Among the women studied, 35.4% had premature rupture of membrane (PROM). PROM has been linked to significant adverse events with puerperal sepsis inclusive. Deliveries complicated by term PROM might show unfavorable maternal outcomes especially if the duration is greater than 12 hours[28].

The study also noted that while the majority of the women developed sepsis symptoms in the first week of delivery, only 62.7% presented in the first week with a mean onset of symptoms before presenting of 4.3 days. This means there was a delay in deciding to seek care and this is known to have significant impacts on health outcomes.[29,30] Early presentation may allow prompt detection, early institution of treatment, prevention and treatment of complications. This delay must have contributed to the complications in management including the long hospital stay some of these women experienced in this review.

Klebsiella spp and *Escherichia coli* were the most common organisms isolated. This is similar to the report from Port-Harcourt, South-south Nigeria, where Klebsiella spp was the most isolated organism.[10] This finding is in contrast to the result of studies from Lagos, Sokoto, and Maiduguri Nigeria, where *Staphylococcus spp* were the most isolated organism.[1,16,31] This may reflect the difference in geographical and socio-cultural practices. The two most common organisms isolated from our study belong to the family Enterobacteriaceae and are normal intestinal flora also inhabiting water and soil. They are aerobic Gram-negative organisms that tend to act as opportunistic pathogens when they are introduced into body locations where they are not normally found.[32,33]

Additionally, the isolated organisms were mostly sensitive having 100% susceptibility to the third-generation Cephalosporins (ceftazidine and ceftriaxone) and Quinolones (ciprofloxacin, ofloxacin and amikacin). This was in keeping with the report by Ouonuju *et al.* who also showed that the *Klebsiella* species isolated were highly susceptible to ceftriaxone, ceflazidime, ciprotloxacin and ofloxacin.[10] Meanwhile, in the Bako *et al.* study, it was found that the isolated micro-organisms (*Staphylococcus aureus* and *Eschericia coli*) had high susceptibility of >93% to Ofloxacin, Ciprofoxacin and Cefuroxime.[31] Moreover, the isolates (*Staphylococcus spp*, *Eschericia coli* and *Klebsiella spp*) found by Adebanjo *et al.* were sensitive to Co-amoxiclav, Levofloxacin and Gentamycin with *Staphylococcus spp* and *Eschericia coli* having >83% sensitive to Co-amoxiclav and Levofloxacin while *Klebsiella spp* was 100% sensitive to Gentamycin.[16] This implies that ceftazidine, ceftriaxone, ofloxacin, ciprofloxacin and amikacin should be regarded as first-line drugs in the therapy regimens for puerperal sepsis in our environment.

Our study detected that quite a noticeable number of the cases reviewed did not have an endo-cervical swab taken for microscopy culture and sensitivity. This was documented as due to financial constraints since most patients pay out of pocket. Among those that had a microbial analysis done, 20.3% had no growth from the culture. Though, this may be due to human or technical errors, or the women might have used antibiotics before presenting to our health facility thereby masking the result, mixed growth also occurred in 5.8% of the specimen. Comparable results were likewise reported in Northeastern Nigeria whereby some mixed growth of microbial organisms and no growth of some culture was also recorded.[31]

In addition, 38.6% of the women did not suffer any complication of puerperal sepsis while 9.5% discharged against medical advice. However, anaemia, psychosis, acute kidney injury and multiple organ dysfunction syndromes (MODs) were the complication documented. Anaemia being the most common complication is not unexpected because infection predisposes to anaemia.

Mortality occurred in 26 of the women studied giving a case fatality rate of 16.5%. Though similar studies reported lower rates 3.1% in Port-Harcourt[19], 8.3 % in Lagos[16], and 8.5% in Pakistan.[18] This difference may be attributed to the longer duration of this review (10 years) compared with the shorter duration in the previous studies, the high rate of unbooked patients as well as the complexity of cases because our hospital is a tertiary institution which serves as a referral center. The case fatality rate in our study corroborates findings in previous studies conducted in this facility.[9,34] Maternal mortalities were higher in women with septic shock, MODs and those with abdominopelvic collection requiring laparotomy for drainage with most of the mortality occurring within the first week of presentation.

CONCLUSION
Puerperal sepsis contributes to maternal mortality and morbidity in Ibadan. We suggest third-generation Cephalosporins and Quinolones be included in the puerperal sepsis protocol and be considered first-line antibiotics, especially in patients with financial constraints who might not be able to afford the series of investigations before treatment. Also, the healthcare sector should promote the laudable importance of ANC because puerperal sepsis was more prevalent among unbooked women.

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