PREVALENCE AND RISK FACTORS FOR PUERPERAL SEPSIS AT THE PUMWANI MATERNITY HOSPITAL.

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ABSTRACT

Introduction: Puerperal sepsis is the third most common cause of maternal mortality worldwide. It remains one of the leading preventable causes of maternal mortality. Given its significant burden in terms of morbidity, mortality and healthcare costs, studies on hospital specific incidences and patterns are important to help inform policy for its prevention and management. The aim of this study was to determine the prevalence and factors associated with puerperal sepsis at Pumwani Maternity Hospital, Kenya.

Methodology: We conducted a case-cohort study among post partum women admitted at Pumwani Maternity Hospital. Eligible women were invited to respond to a verbal researcher administered questionnaire assessing medical and obstetric history. Those recruited, were each called at day 7 and day 14 postpartum and asked a standard set of questions related to infection-related symptoms. In addition, all enrolled women who attended a postnatal follow up visit at 14 days postpartum were reviewed, using a history and clinical examination. The data was analysed to identify potential maternal risk factors associated with occurrence of puerperal sepsis.

Results: Seven hundred and ninety three postnatal mothers at Pumwani maternity hospital were recruited, of which 566 women responded at two weeks postpartum. Sixty nine women among the 566 met the criteria for puerperal sepsis. This corresponded to a prevalence of 12.2% at two weeks postpartum (95% CI 9.5 – 14.9%). Further analysis was done using 69 cases; each with 3 randomly selected controls. No deaths were reported. Risk factors included labour lasting >24hours, caesarean section, obstructed labour, and multiple vaginal examinations.

Conclusion: The prevalence of puerperal sepsis in this cohort at two weeks postpartum at Pumwani Maternity Hospital was at 12.2%(95% CI 9.5-14.9). Two or more vaginal examinations, prolonged and obstructed labour, and Caesarean section were found to be significantly associated with increased odds of puerperal sepsis. Appropriate measures like appropriate infection prevention protocols should be utilized in order to prevent avoidable complications of labour and delivery that can lead to puerperal sepsis.

Key words: Puerperal sepsis, morbidity, infection.

INTRODUCTION

Globally, an estimated 303,000 maternal deaths occurred in the year 2015 of which 66% were in Sub-Saharan Africa alone (1). Sepsis is the third most common cause of maternal death, after haemorrhage and abortion, accounting for 11% of global maternal deaths (1).

There has been a wide range of incidences reported (0.1-11%) in countries in Africa and around the world (2). This wide range may be due to the fact that the definition of puerperal sepsis used by different studies varies, complicating meaningful comparisons. Puerperal sepsis also has a wide range of clinical presentations. The World Health

Organisation defined puerperal sepsis as infection of the genital tract occurring at any time between the onset of rupture of membranes or labour and the 42nd day postpartum in which two or more of the following are present: pelvic pain, fever, abnormal vaginal discharge, abnormal smell/foul odour discharge or delay in uterine involution (3). Symptoms of postpartum infections generally occur after hospital discharge, which is usually within 24 hours after vaginal birth (4). Therefore, in the absence of postnatal follow-up (as is often the case in lower-income countries), puerperal infections can go undiagnosed and unreported (5). Microbiological investigations to confirm diagnosis are not always available in low resource settings (6, 7). Most of the epidemiological data available on incidence in sub-Saharan countries are small, single-center studies, that are not generalizable to larger populations.

We conducted a prospective study to determine the incidence of and risk factors for puerperal sepsis in women delivering at Pumwani Maternity Hospital, a high volume referral hospital in Kenya.

METHODOLOGY

We conducted a case-cohort study among post partum women admitted at Pumwani Maternity Hospital. Women were enrolled within 24 hours of delivery; those who delivered at less than 28 weeks gestation or had chorioamnionitis were not eligible. Written, informed consent was obtained from each patient. In the event women were unable to provide consent due to pain or inability to converse privately they were not recruited. Ethical approval was obtained from Kenyatta National Hospital Ethical Research Committee, and Pumwani Maternity Hospital.

Women who were admitted for delivery (or within 24 hours of delivery) were assessed for eligibility, and if eligible, invited to participate in the study. Informed consent was obtained; they were invited to respond to a verbal questionnaire assessing medical and obstetric history, administered by a researcher. Management proceeded as per hospital protocol and the patients were eventually discharged. Those recruited, were each called at day 7 and day 14 postpartum and asked a standard set of questions related to infection-related symptoms. Those that reported symptoms during the phone call were asked to come in for a clinical exam for confirmation. In addition, all enrolled women who attended a postnatal follow up visit at 14 days postpartum were reviewed, using a history and clinical examination. Cases identified during the postnatal visit were considered to be those with two or more features of puerperal sepsis on clinical examination that include: pelvic pain, fever (38 degrees Celsius and above), uterine sub involution, abnormal vaginal discharge/ foul smelling lochia, episiotomy/ perineal tear infection, and Caesarean section wound infection. If a case was identified, the woman underwent investigations that included a full blood count and a high vaginal swab for microscopy and culture. All cases of puerperal sepsis were managed as per the hospital protocol.

The sample size was calculated using Fleiss formula (8) at a ratio of 1:3, and an assumed prevalence rate of 10% (based on previous studies); we added 20% for loss to follow up and used a power of 80%. This gave a needed sample of 65 cases and 195 controls.

Descriptive analysis of study population was conducted, as well as bivariate analysis to identify potential maternal risk factors associated with occurrence of puerperal sepsis. Odds ratios (OR) and their 95% confidence intervals (CIs) were calculated, with $p \leq 0.05$ was considered statistically significant. All analyses were performed using STATA.

RESULTS

A total of 793 postnatal mothers at Pumwani maternity hospital were assessed as eligible and recruited into the study between March 2015, to November 2015.

In total, 676 (85.2%) of these women responded on phone by week one postpartum and by week 2 postpartum, 566 (71.3%) women responded (Figure1).

Of the 676 patients contacted by phone at 7 days postnatal, 59 patients met the criteria for diagnosis of puerperal sepsis based on reported clinical symptoms. This corresponded to a prevalence of 8.7%, for sepsis. Based on the 14 days postnatal interview and clinical examination, 69 of 566 women met the criteria for puerperal sepsis diagnosis based on reported symptoms and clinical examination;

corresponding to a prevalence of 12.2%, for puerperal sepsis.

In both groups, the majority of women were 20-24 years old (46.4% and 42.6%), married (78.3% and 86.1%), and had attained secondary level education (42% and 48.3%). Nearly half reported their occupation as housewives (44.9%, 48.3%) (Table 1). None of the collected socio-demographic characteristics were significantly associated with occurrence of puerperal sepsis.

A majority of women with puerperal sepsis had a BMI of 18-24.9 (32/69, 46.4%), and a haemoglobin level of >10g/dl (60/69, 87%) (Table 2). Of the 69 women who developed puerperal sepsis, 65 were HIV negative (94.2%). History of foul smelling vaginal discharge two weeks prior to delivery was associated with increased risk of puerperal sepsis (OR 3.21, 95% CI: 1.70-6.09; p-val <0.001).

Intrapartum factors significant associated with increased odds of puerperal sepsis were being in active phase of labour for greater than 24 hours (OR 4, 95% CI: 1.6-9.9, p val; 0.003), and receiving 2 or more vaginal examinations (p val < 0.05) (Table 2).

The lab investigations that were done revealed that 95% of those that presented with clinical features of puerperal sepsis, had a normal haemoglobin and white blood cell count. However, 56% of these were culture positive on high vaginal swab. A majority of the organisms found were S.aureus and E.coli (Table 3).

DISCUSSION

The prevalence of puerperal sepsis in this study of women giving birth at a major tertiary centre in Kenya was 12.2% at two weeks postpartum. Obstructed labour, multiple vaginal examinations, and Caesarean section were significantly associated with occurrence of puerperal sepsis. There were no significant associations with anaemia and HIV.

The prevalence in our study is slightly higher than similar studies in other sub-Saharan African countries that ranged at 0.1-10% (1). Few studies have been published on prevalence of puerperal sepsis in Kenyan hospitals.

In 1988, Plummer et al reported a prevalence of 20.3% amongst 1013 women delivering at a Nairobi Maternity hospital (9). However, they reported only the prevalence of STIs (specifically N. gonorrhoea and C.trachomatis). The difference to our findings may be due to a different population sample, or could be explained by the possibly increased use of condoms and antibiotics. A much larger study of puerperal sepsis prevalence in 6 countries in West Africa by Prual et al, 2000, reported a prevalence of severe sepsis of 1.4% amongst postpartum women, however their definition of a case was that of severe maternal morbidity(10). In similar studies in developed country settings, the prevalence of puerperal sepsis is generally lower, (1). We expected a comparatively higher rate of puerperal sepsis in PMH, due to the high level of complicated cases (PMH is a tertiary care centre), as well as a higher burden of infectious diseases in Kenya. (9) The larger difference in our study compared to those in developed countries would include the advancement in their infrastructure, availability of health care services and hence reduction in delay to seeking care which is one of the major factors contributing to puerperal sepsis.

It is noteworthy that studies often vary widely in estimating prevalence of puerperal sepsis due to inconsistency in definitions used (1,5,10). Greater standardization of clinical and diagnostic criteria would permit greater comparability of prevalence measures between studies.

Identified factors associated with sepsis in our study are similar to other studies (1), however this study, unlike the review by Hussein J et al, found no association with anaemia, history of prolonged rupture of membranes or lacerations of the genital tract.

Multiple vaginal examinations also had a significant association with those more than 2 having a higher risk for developing puerperal sepsis. This is in keeping with a study by Dare et al (Nigeria), that showed multiple vaginal examinations was associated with increased risk of puerperal sepsis. The lack of substantial risk factors in various studies highlights that sepsis can affect everyone, not just particular subgroups. Thus the standard of care for

all women needs to be improved; risk reduction strategies might not work in these cases.

In a review of bacteriology by Anne Miller, a wide range of organisms were cultured from swabs from the women with a diagnosis of puerperal sepsis (11). A majority of them cultured sexually transmitted organisms, as well as maternal gut flora. Others had organisms across more than 3 groups and were therefore difficult to classify. As per the classification in this review, our study found organisms within the nosocomial group as well as the maternal gut flora. This points to the aetiology of infection as well as preventive measures that could be taken in order to decrease the incidence of puerperal facility in this setup.

Appropriate tools should be put to use in order to prevent prolonged and obstructed labour. Vaginal examinations should be kept to a minimum.

The study was based in the largest maternity centre in east and central Africa, attending to an estimated 20,000-30,000 deliveries each year. The study was able to assess multiple variables. However, one of the limitations of our study was the loss to follow up; which we tried to minimize through multiple attempts to contact participants. This was a single site study hence the results may not be a representation of the whole country or other health facilities. PMH is a tertiary care institution with a high proportion of referral and complex cases, it would be reasonable to expect a higher rate of complications than other lower-level or non-referral institutions.

Research into different areas and interventions that may be done to target the reduction in prevalence of puerperal sepsis is advised. Identification of weaknesses in adherence to protocols for infection prevention and control, operative procedures and their protocols. Use of RCT's to assess whether efforts at interventions, for example, antibiotic prophylaxis for caesarean sections at PMH are actually producing results.

Table 1: Association between Socio-Demographic characteristics and Puerperal Sepsis among the Study Participants at PMH

	Puerperal sepsis		OR (95% CI)	Chi-squared p-value
	YES (n = 69)	NO (n = 207)		
Maternal age				
<20 years	7(10.1)	14(6.8)		
20-24 years	32(46.4)	87(42.0)	0.74(0.27-1.99)	0.545
25-29 years	16(23.2)	64(30.9)	0.50(0.17-1.44)	0.2
30-34 years	10(14.5)	30(14.5)	0.67(0.21-2.12)	0.492
35 years and above	4(5.8)	12(5.8)	0.67(0.16-2.84)	0.584
Marital status				
Single	12(17.4)	27(13.0)		
Married	55(79.7)	178(86.0)	0.70(0.33-1.46)	0.338
Divorced	2(2.9)	2(1.0)	2.25(0.28-17.91)	0.444
Education				
None	2(2.9)	2(1.0)		
Primary	28(40.6)	78(37.7)	0.36(0.05-2.67)	0.317
Secondary	29(42.0)	100(48.3)	0.29(0.04-2.15)	0.226
Tertiary	10(14.5)	27(13.0)	0.37(0.05-2.99)	0.352
Occupation				
Housewife	31(44.9)	100(48.3)		
Business or farming	20(29.0)	49(23.7)	1.32(0.68-2.54)	0.412
Formal employment	3(4.3)	16(7.7)	0.60(0.17-2.21)	0.447
Informal employment	15(21.7)	42(20.3)	1.15(0.56-2.35)	0.698

Table 2: Ante Natal and Intrapartum Factors associated with Puerperal Sepsis in women delivering at PMH

Risk factor	Puerperal sepsis		OR(95% CI)	p-value
	YES (n = 69)	NO (n = 207)		
Hemoglobin				
5.1-8 g/dl	1(1.4)	3(1.4)	1.00	
8.1-10 g/dl	6(8.7)	10(4.8)	1.80(0.15-21.48)	0.642
>10g/dl	62(89.0)	194(93.7)	0.95(0.10-9.33)	0.967
HIV test				
Reactive	3(4.3)	12(5.8)	0.74(0.2-2.7)	0.647
Non-reactive	66(95.7)	195(94.2)		
Foul smelling discharge 2 weeks prior to delivery				
Yes	23(33.3)	28(13.5)	3.20(1.69-6.1)	<0.001
No	46(66.7)	179(86.5)		
BMI				
<18	3(4.3)	17(8.2)		
18-24.9	35(50.7)	113(54.6)	1.76(0.49-6.34)	0.391
25-30	24(34.8)	61(29.5)	2.23(0.60-8.31)	0.232
>30	7(10.1)	16(7.7)	2.48(0.54-11.28)	0.24
Parity				
Primigravid	35(50.7)	81(39.1)		
Multigravid	31(44.9)	120(58.0)	0.60(0.34-1.05)	0.072
Grand multigravidity	3(4.3)	6(2.9)	1.16(0.27-4.89)	0.843
Duration of Active Phase of Labour				
<12 hrs	49(71.0)	177(85.5)		
12-24 hrs	9(13.0)	19(9.2)	1.71(0.73-4.02)	0.218
>24 hrs	11(15.9)	10(4.8)	3.97(1.59-9.90)	0.003
Duration/ time since drainage				
<12 hrs	30(43.5)	124(59.9)		
12-24 hrs	7(10.1)	12(5.8)	2.41(0.87-6.65)	0.089
>24 hrs	3(4.3)	5(2.4)	2.48(0.56-10.96)	0.231
Number of V/Es				
<2	9(13.0)	56(27.1)		
2 to 4	49(71.0)	133(64.3)	2.29(1.05-4.98)	0.036
5 and above	11(15.9)	18(8.7)	3.80(1.36-10.64)	0.011
Tear				
Yes	19(27.5)	62(30.0)	0.89(0.48-1.63)	0.703
No	50(72.5)	145(70.0)		

Table 3: Culture results of patients found to be Culture Positive.

Organism	No.
S. aureus	9
E.coli	10
S. faecalis	2
S. agalactiae	2
Klebsiella	3
T.vaginalis	2
candida	4
TOTAL	**32/57**

CONCLUSION

In a sample of postpartum women giving birth at Pumwani Maternity Hospital in Kenya, the prevalence of puerperal sepsis at two weeks postpartum was estimated at 12.2%.

Antepartum history of foul smelling discharge, multiple (>2) vaginal examinations, prolonged and obstructed labour were found to be significantly associated with puerperal sepsis. A majority of the causative organisms were nosocomial infections. Efforts are needed to improve the prevention, recognition, and management of puerperal sepsis.

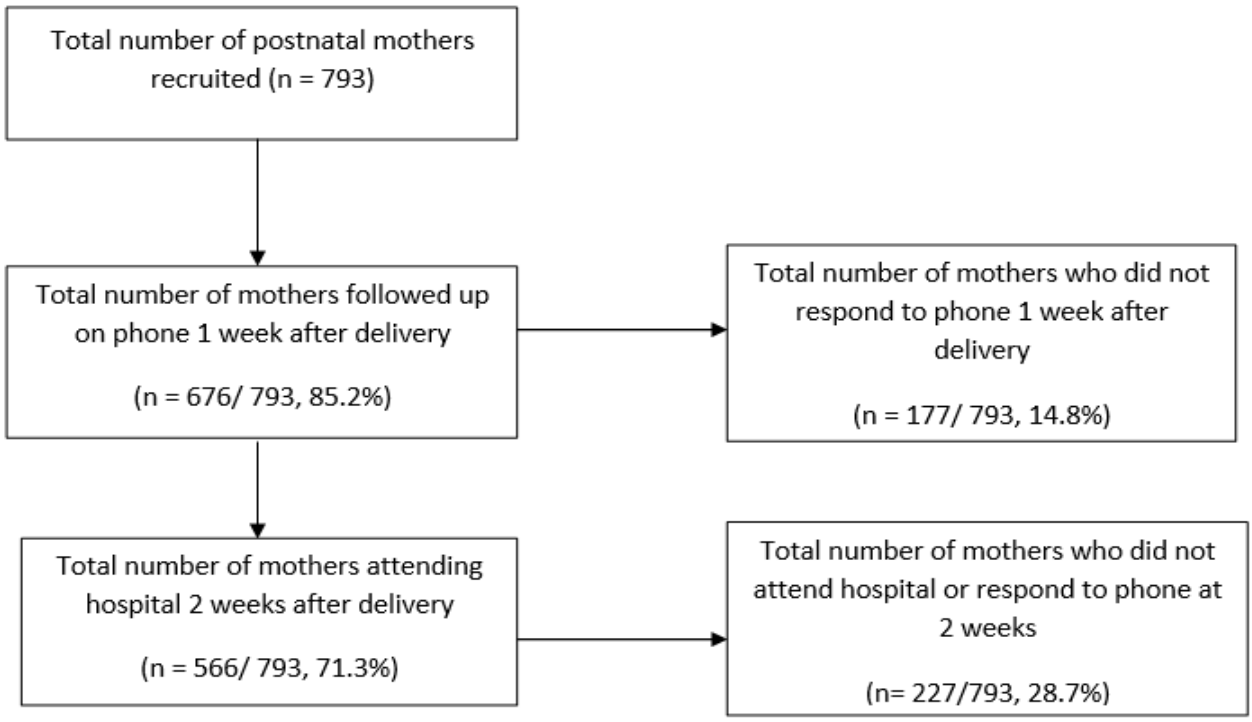

Figure 1: Participant Flow from Recruitment to Week Two Follow Up after delivery at Pumwani Maternity Hospital

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Ethics: Ethical approval was obtained from the KNH and PMH research and ethics committee. Written, informed consent was sought and obtained for all patients recruited in this study.

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