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■ Original Research Article

Comparison of Short Course with Long Course Antibiotic Prophylaxis for Caesarean Section: A Randomized Controlled Study

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ABSTRACT

Background: Antibiotic prophylaxis in caesarean section is intended to prevent post-partum infectious morbidity and mortality associated with the procedure. Judicious use of prophylactic antibiotics also reduces the incidence of adverse drug reactions and antibiotic resistance. Although there are guidelines and recommendations for the duration of antibiotic prophylaxis for caesarean section, these are often not adhered to in most healthcare facilities. **Objective:** This study compares the efficacy of short-course antibiotic prophylaxis with long-course prophylaxis in caesarean section. **Methodology:** This was a randomized controlled study in which 200 pregnant women undergoing elective or emergency caesarean section were enrolled into two groups of 100 women each (Group A: short course antibiotics and Group B: long course antibiotics), and monitored for 6 weeks for evidence of febrile morbidity, urinary tract infection, wound infection, and clinical endometritis. The secondary outcome measures were the cost of antibiotics and hospital care. **Results:** There was no statistical difference in the incidence of wound infection (3% vs 1%, p-value 0.31, and urinary tract infection (0% vs 1%, p-value 0.32) in the short and long-course antibiotic groups respectively. The cost of antibiotics and hospital care was significantly higher in long course antibiotic group (p-value< 0.001) **Conclusion:** Short-course prophylactic antibiotic prophylaxis has comparable efficacy and is more cost-effective than long-course prophylactic antibiotics in preventing post-caesarean section infectious morbidities.

Keywords: Prophylactic Antibiotics, Caesarean Section, Infectious Morbidity, Post-Operative

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INTRODUCTION

Caesarean section is one of the most commonly performed surgical procedures in the world.[1] Although it is a lifesaving procedure, it is associated with some maternal risks. Maternal mortality and morbidity are approximately five times greater with caesarean section than with vaginal birth.[2] Postoperative infectious complications contribute to the high disease burden in developing countries and also account for prolonged hospital stays and an increase in the cost of treatment following caesarean section.[3] These factors, no doubt, contribute to the predominant aversion to a caesarean section in our environment, among other cultural and religious factors.[1,2]

The major post-caesarean infectious morbidities are febrile morbidity, endometritis, urinary tract infections, and wound infection.[3] Wound (surgical site)

infections are the most frequent healthcare-associated infections in low- and middle-income countries.[4] Globally, the most common intervention for preventing morbidity and mortality related to maternal peripartum infection is the use of antibiotics for prophylaxis and treatment.[5] Surgical antibiotics prophylaxis is defined as the rational, safe, and effective use of antimicrobial agents for the prevention of initial surgical site infections, or as the use of antibiotics to prevent postoperative infections. [6]

It is based on the concept that bacterial contamination occurs during surgery and that the administration of the antibiotics used for prevention must be timed for optimum blood levels in the peri-operative period. However, antibiotics misuse for obstetric conditions or procedures that are thought to carry the risk of infection is common in clinical practice.[5] Such inappropriate use of antibiotics among women giving birth has implications for the global efforts to contain the emergence of antibiotic-resistant bacteria. Evidence from studies on antibiotics prophylaxis for caesarean section shows a significant reduction in the rate of febrile morbidity, wound infection, urinary tract infection, maternal mortality, and length of hospital stay when compared with placebo.[5, 7]

The World Health Organization (WHO) recommendation on surgical antibiotics prophylaxis for caesarean section includes the following: routine antibiotics prophylaxis for women undergoing elective and emergency caesarean section (strong recommendation), prophylactic antibiotics should be given before skin incision, rather than intraoperatively after umbilical cord clamping (strong recommendation), and a single dose of first-generation cephalosporin or penicillin should be used in preference to other classes of antibiotics (conditional recommendation).[5]

Although there are guidelines and recommendations for surgical antibiotics prophylaxis, prolonged use of antibiotics for up to 7 days following a caesarean section is being practised in many healthcare facilities in developing countries.[8] One major reason why long-course surgical antibiotics prophylaxis is widely practised in developing countries is that many medical practitioners believe that strict asepsis cannot be guaranteed. This is ascribed to epileptic power supply and inadequate facilities for sterilization.[3] Other factors include poor infection-control strategies, poor hospital and operating room environment, and generally poor pre-operative preparation of patients like skin antisepsis and inappropriate hair removal.[9] Concerns about the generally poor level of personal hygiene are a key reason many practitioners administer long-term surgical antibiotic prophylaxis.[9,10] Such practices ultimately lead to increases in adverse events, antibiotic resistance, and treatment costs.[11]

Many studies have been done to establish the incontrovertible importance of prophylactic antibiotics in caesarean section. However, there is inconsistent, variable, and haphazard application of recommendations for its use. [12-15]

In many trials, the recommended duration of prescribed antibiotics has been reduced from greater than or equal to five days to three days, then twenty-four hours, then to three doses, and finally to a single dose.[12] This is in line with the World Health Organization's call for all countries to optimize the use of anti-microbial agents and strengthen knowledge about antimicrobial resistance through surveillance and research.[16] However, about 35% of obstetricians in Nigeria are not aware of an evidence-based regimen for antibiotic prophylaxis involving the use of single-dose antibiotic prophylaxis in caesarean section, and less than 25% of those that were aware practice it due to fear of post-caesarean infectious morbidity.[10]

We lack a local guideline for antibiotic prophylaxis in caesarean sections, so patients typically receive antibiotics for 5 to 7 days. We aimed to compare the efficacy of short-course versus long-course antibiotic prophylaxis in terms of febrile morbidity, endometritis, wound infection, urinary tract infection, and treatment costs. This study seeks to develop a consistent protocol for prophylactic antibiotics in our centre. If short-course treatment is effective, it may alleviate concerns among practitioners hesitant to adopt this approach.

MATERIALS AND METHODS

This study was a randomized controlled trial on the efficacy of short-course compared with long-course antibiotic prophylaxis for caesarean section conducted at the Asokoro District Hospital (ADH) Abuja. ADH is owned by the Federal Capital Territory Administration (FCTA) and is located in the Asokoro District of the Abuja Municipal Area Council. It has a total bed capacity of 120. The average annual delivery rate of the hospital is 2000. The Caesarean section rate is between 30-35%. Postoperatively, patients are usually placed on intravenous Ceftriaxone and Tinidazole/Metronidazole for 48 hours, then oral Cefuroxime and Tinidazole/ Metronidazole for 5 days. Post-operative analgesia is usually intramuscular Pentazocine and Diclofenac (suppository and oral).

All consenting pregnant women undergoing elective or emergency caesarean section during the study period were recruited for the study. Women who declined consent, had ruptured fetal membranes for over 24 hours, had anaemia (Pre-operative haemoglobin level less than 10g/dl /PCV less than 30%), were HIV positive, Diabetic, received antibiotics within two weeks before the operation, fever within 72 hours before the operation,

obesity (Body Mass Index at delivery >35kg/m^2), smoke cigarette, pre-operative hospitalization for over 2 weeks, have a known allergy to any of the drugs, have chorioamnionitis or any overt infection, or had intrauterine fetal death were excluded from the study. Structured questionnaires were administered to the patients who met the inclusion criteria as they were recruited between 14th April 2021 and 21st January 2022.

Evaluation of Study Subjects.

Patients were pre-operatively reviewed by researchers and trained assistants to confirm study eligibility. History was taken, a physical examination was conducted, and patients were counseled on the research purpose. Consent was obtained, followed by administering a questionnaire. For elective surgeries, patients were shaved and catheterized on the morning of the procedure, while this was done immediately for emergency cases after consent was obtained. Pre-operative information obtained included the age, parity, history of previous caesarean section, and the category of the index operation among others. Pre-operative investigations done for all the subjects included packed cell volume and urinalysis.

In the theatre, the patients were anaesthetized and then placed in the supine position with a left lateral tilt. The prophylactic antibiotics were then administered (intravenous ceftriaxone 1g) to all subjects in both groups. This was repeated intraoperatively for a patient whose intraoperative blood loss was more than 1.5 liters as recommended by the WHO. [12] The general principles of surgical sterility were observed in all cases. All surgical instruments were sterile.

The surgeon, the assistant surgeon, the perioperative nurse, and the anaesthesiologist scrubbed and wore disposable sterile gowns for each case. Sterile preparation of the surgical site was done using chlorhexidine and methylated spirit. The patient was draped in disposable sterile drapes. The skin incision was made with a sterile surgical blade mounted on a Bard-Parker. Routine lower segment caesarean section was done for all the study participants and the placenta was delivered by cord traction. The uterus was repaired in two layers with Vicryl suture. The rectus sheath and the subcutaneous tissue were repaired with vicryl sutures. The skin was repaired with vicryl or nylon suture. The surgical wound was cleaned and dressed with sterile gauze. Blood loss was estimated by visual estimation. Intraoperative data collected included the type of anaesthesia, type of skin incision, estimated blood loss, duration of surgery, and the cadre of the surgeon. Each patient was then transferred to the recovery room and vital signs were monitored quarter-hourly for one hour before being transferred to the ward for further care and observation.

In the study, group A (short course) received a 1g intravenous dose of ceftriaxone within one hour of skin incision and no further antibiotics. Group B (long course) received the same initial dose followed by subsequent doses every 12 hours, along with intravenous metronidazole/tinidazole for 48 hours, and oral antibiotics for 5 days. Nurses administered the medications. All the subjects also received intravenous fluids until oral intake was commenced, as well as adequate analgesia. Patients were monitored as in-patients for 5 days post-operatively before discharge, during which their wounds were inspected, and a full blood count was taken on the second day. They were followed for 6 weeks for febrile morbidity, urinary tract infections, wound infections, and clinical endometritis. Secondary outcomes included the cost of antibiotics and hospital care.

They were counseled to take their medications as prescribed and to report symptoms like fever, wound discharge, undue pain at the operation site, vaginal discharge, dysuria, and urinary frequency at the postnatal clinic. The patients were given appointments to be seen twice weekly for the first two weeks and finally at six weeks. Each patient received the researchers' phone number to report any concerns before their appointment, allowing for rescheduling if needed. They were asked to undergo a full blood count one week after hospital discharge. At the post-natal clinic, patients discussed any complaints, underwent physical examinations, and had their blood count results reviewed.

All drugs were supplied by the Hospital's Pharmacy. The brand of Ceftriaxone used for the study was BAXCEF manufactured by Kilitch Drugs (India) Limited; which is the brand of ceftriaxone being supplied by the hospital pharmacy through the Abuja Central Medical Stores. The Batch Number of the brand (BAXCEF) that was used for the study was 20137562.
The following post-operative complications were recorded as primary outcome:

Post-operative febrile morbidity defined as axillary temperature of 38^0 C or more on 2 occasions at least 6 hours apart in any two of the first 10 days excluding the first 24 hours, clinical endometritis as fever, tachycardia, uterine tenderness and/or offensive lochia, wound Infection as partial or total wound dehiscence, purulent discharge, localized swelling, warmth and tenderness and Urinary Tract Infections as dysuria, suprapubic pain, urinary frequency.

Depending on the symptoms and signs, the relevant sample was collected and sent for full blood count, blood film for malaria parasites, wound swabs for microscopy, culture, and sensitivity. All patients who developed post-operative infections were treated with antibiotics based on their sensitivity pattern while patients with malaria were treated with Artemisinin-based combination therapy. Wound morbidity was

managed by local wound toileting with normal saline irrigation and EUSOL. The secondary outcomes were the cost of antibiotics used and the cost of treatment in each group of study.

Sample Size Determination

The sample size was determined using the statistical formula for the comparison of two proportions in a randomized controlled study as follows:

$$N = \frac{1}{(1-f)} X \left[\frac{2\,(Z_a + Z_b)^2 \times P\,(1-P)}{(P_0 - P_1)^2} \right]$$ [17]

Therefore, the minimum sample size required for each study group for it to be statistically significant was 91 subjects per group.This was approximated to 100 subjects per group making a total of 200 subjects.

Sampling Technique

A sample size of 200 was generated using random number tables, divided into elective and emergency caesarean sections. Each block had 100 women receiving either short-course antibiotics (A) or long-course antibiotics (B). In Asokoro District Hospital, the ratio of elective (Category 4) to emergency (Category 1 to 3) caesarean section is about 70% to 30%. The same proportional number of participants were allocated to each block, that is; 70% for elective caesarean section (Category 4) and 30% for emergency caesarean section (Category 1 to 3). Therefore, 140 of the 200 participants (70%) were in the elective caesarean section group while 60 of the participants (30%) were in the emergency caesarean section group. Based on the above; the unique study numbers were generated using a computer application. The study numbers were assigned using identical square cards labeled "A" for the short course and "B" for the long course antibiotics. Patients, based on whether they were undergoing an elective or emergency caesarean section, picked a card from the appropriate bag. The assigned study number and antibiotic regimen were then administered accordingly.

Data Analysis

Data collation, entry, and cleaning ensured the reliability of the processed data. Results were analyzed using SPSS version 23 and presented in tables. Summary statistics, including mean and median, were calculated. The Chi-square test and Student's t-test assessed significance for categorical and continuous variables, with a p-value <0.05 considered statistically significant.

Ethical Considerations

Ethical clearance for this study was obtained from the Health Research Ethics Committee of the Health and Human Services Secretariat of the Federal Capital Territory, Abuja (Approval number: FHREC/2020/01/94/24-09-20). Participation in this study was entirely voluntary with no consequences for refusal or withdrawal from the study.

RESULTS

The majority of the study participants in the two groups were in the 30 -39 age group (67% in Group A and 73% in Group B), with a mean age of 32.17±4.26 years for Group A and 32.72±4.57 years for Group B. The parity of the study participants was similar as 73% and 78% of the participants in Group A and Group B respectively were Para 1-4. The indications for Caesarean section followed similar trends with 32% and 33% of participants in Group A and Group B respectively having primary Caesarean section, and 95% of cases in Group A and 91% in Group B had no co-morbidity. There was no significant difference in the socio-demographic and clinical characteristics of the study groups (Table 1).

The perioperative events of the study groups are shown in Table 2. The mean pre-operative packed cell volume was similar with Group A having 35.85±3.15 and Group B 35.3±3.28. The majority of the participants in Group A (58%) had pre-operative PCV of between 35 and 39 while 46% had pre-operative PCV of between 30 and 34 in Group B. Post-operative PCV of below 30% was recorded in 16% of participants in Group A and 22% in Group B. All the participants in Group A and 97% in Group B had spinal anaesthesia. Similarly, the majority of the surgeries were done by senior registrars in both groups (82% in Group A vs 79% in Group B). The mean blood loss was 549±161.59mls in Group A and 525.3±217.9mls in Group B.

The mean duration of surgery was 48.32±11.72 minutes and 49.04±13.70 minutes in Groups A and B respectively. There was no statistically significant difference in the values obtained for the post-operative white blood cell counts done in the first and second week of surgery (Group A 87% versus Group B 89%; Group A 88% versus Group 81%). However, 4% of the participants in Group A and 8% in Group B declined to do the full blood count in the second week of surgery even though they did not opt out of the study. The commonest organism cultured from the wound swab of those that had wound infection was Escherichia coli in 75% of the cases while Staphylococcus aureus was cultured in 25% of the cases. The mean costs of antibiotics (N758±333.09 vs N7,153±676.21, p<0.001) and hospital care (₦73,512 ±1773.85 vs ₦79,473 ± 1131.98, p<0.001) in Group A and Group B respectively were significantly higher in group B.

Table 1: Socio-demographic and clinical characteristics of study participants

Variable	Group A (n=100) Mean±SD	Group A (n=100) Frequency (%)	Group B (n=100) Mean±SD	Group B (n=100) Frequency (%)	Chi-square/t-test*	p-value
1. Age (years)	32.17		32.72			
20-29	±4.26	28(28%)	±4.57	22(22%)		
30-39		67(67%)		73(73%)		
40-49		5(5%)		5(5%)	1.772*	0.43
2. Parity						
0	2.3±1.6	24(24%)	2.2±1.5	18(18%)	1.166*	0.56
1-4		73(73%)		78(78%)		
≥5		3(3%)		4(4%)		
3. category of Caesarean section						
Elective		70(70%)		70(70%)	0.000	1.00
Emergency		30(30%)		30(30%)		
4. Type of caesarean section						
Primary		32(32%)		33(33%)		
Secondary		68(68%)		67(67%)	0.023	0.86
5. Indication for caesarean section						
1 previous cs		34(34%)		30(30%)		
≥2 previous cs		34(34%)		37(37%)		
Breech in primigravida		7(7%)		7(7%)		
Invitro fertilization pregnancy (IVF)		2(2%)		0(0%)		
Oligohydramnios		1(1%)		1(1%)		
Pregnancy-induced hypertension		2(2%)		3(3%)		
Placenta praevia		3(3%)		3(3%)	6.199	0.86
Pre-eclampsia		7(7%)		8(8%)		
Transverse lie		2(2%)		5(5%)		
Twin gestation		3(3%)		1(1%)		
Others		5(5%)		5(5%)		
6. Comorbidity						
Yes		5(5%)		9(9%)	1.229	0.32
No		95(95%)		91(91%)		

Table 2: Peri-operative events in Group A and group B

Variable	Group A		Group B		Chi-square/ t-test*	P value
	Mean ± SD	Freq (%)	Mean ±SD	Freq (%)		
Pre-operative PCV (%)					1.209*	0.228
30 - 34	35.85±3.15	31(31%)	35.3±3.28	46(46%)		
35 - 39		58(58%)		41(41%)		
40 - 44		11(11%)		13(13%)		
2. Post-operative PCV (%)	32.33±3.19		32.09±3.31		0.522*	0.602
20 - 24		1(1%)		1(1%)		
25 - 29		15(15%)		21(21%)		
30 - 34		56(56%)		54(54%)		
35 - 39		28(28%)		24(24%)		
Type of Anaesthesia					3.046	0.08
General		0(0%)		3(3%)		
Spinal		100(100%)		97(97%)		
Type of skin incision					3.789	0.06
Pfannenstiel		98(98%)		92(92%)		
Midline		2(2%)		8(8%)		
Cadre of surgeon					0.309	0.95
Registrar		9(9%)		11(11%)		
Senior registrar		82(82%)		79(79%)		
Consultant		9(9%)		10(10%)		
Blood loss(mls)						
100-500	549±161.59		525.3±217.9		0.873*	0.383
		52(52%)		65(65%)		
501-1000		47(47%)		34(34%)		
1001-1500		1(1%)		0(0%)		
1501-2000		0(0%)		1(1%)		
7. Duration of surgery(mins)	48.32±11.72		49.04±13.70		0.399*	0.690
≤25						
		0(0%)		3(3%)		
26-50		69(69%)		60(60%)		
51-75		27(27%)		34(34%)		
76-100		4(4%)		3(3%)		
WBC ($x10^9$/L)					87.624	0.55
Week 1						
0-10.0		87		89		
10.1-20.0		13		10		
>20.0		0		1		
WBC($x10^9$/L)						
Week 2						
0-10.0		88		81	69.661	0.89
10.1-20.0		7		9		
>20.0		1		2		
Missing Values		4		8		
Organism	Freq (%)	Freq (%)				
Escherichia coli	2(50)	1(25)				
Staphylococcus Aureus	1(25)	-				
Total	3(75)	1(25)				
Cost of antibiotics	₦758 ± 333.09		₦7153 ± 676.21		84.837	< 0.001
Cost of hospital care.	₦73,512 ±1773.85.		₦79,473 ± 1131.98		28.326	< 0.001

Table 3: Post-operative infectious morbidity and need for additional antibiotics in the study participants

Clinical outcome	Group A N=100	Group B N=100	Odd ratio	95% confidence interval	P value
	Freq (%)	Freq (%)			
Fever				Nil	Nil
Yes	0(0%)	0(0%)	nil		
No	100(100%)	100(100%)			
Wound infection				0.03-3.19	0.31
Yes	3(3%)	1(1%)	0.33		
No	97(97%)	99(99%)			
Endometritis				Nil	Nil
Yes	0(0 %)	0(0 %)	nil		
No	100(100%)	100(100%)			
Urinary Tract Infection				0.43-0.57	0.32
Yes	0(0%)	1(1%)			
No	100(100%)	99(99%)			
Need for additional antibiotics				0.11- 4.04	0.65
Yes	3(3%)	2(2%)	3.06		
No	97(97%)	98(98%)			
Clinical Outcome	Elective caesarean section(n=140)	Emergency caesarean section(n=60)		Chi-square	P-value
Urinary Tract Infection					
Yes	0(0%)	1(1.7%)			
No	140(100%)	59(98.3%)			
				1.005	0.32
Endometritis					
Yes	0(0%)	0(0%)		-	-
No	140(100%)	60(100%)			
Wound infection					
Yes	2(1.4%)	2(3.3%)			
No	138(98.6%)	58(96.7%)		1.020	0.31
Fever					
Yes	0	0		-	-
No	140(100%)	60(100%)			

Table 3 shows the postoperative infectious morbidity in the study participants. There were no recorded cases of post-caesarean section endometritis and febrile morbidity in both groups. The two cases of infectious morbidities recorded were wound infection (3% versus 1%, P-value 0.31) and urinary tract infection (0% versus 1%, P-value 0.32) in Group A and Group B respectively. Therapeutic antibiotics were needed in 3% of participants in Group A and 2% in Group B, and the difference was not statistically significant. There was also no significant difference in the clinical outcome in emergency versus elective caesarean sections.

DISCUSSION

This study shows that there is no significant difference in the rate of postoperative infectious morbidities between the use of a single perioperative dose of antibiotics (short course or group A) compared to the use of multiple doses of antibiotics for 7 days (long course or group B).

There was no incidence of postoperative febrile morbidity in both groups. This is in contrast to findings in the study by Ezeike et al where an incidence of 1.3% of febrile morbidity was recorded in the long-course antibiotic group and none in the short-course group, but the difference was not statistically significant.[11] Similarly, Shah et al found an incidence of 3.6% febrile morbidity in the short-course group and 1.3% in the long-course group, long course arm and Shakya et al recorded an incidence of post-caesarean febrile morbidity of 4% and 6% in the [18] Ijarotimi et al reported an incidence of febrile morbidity of 17% in the short-course arm and 18% in the short course and long course groups respectively.[3,19] However, the differences observed in all the aforementioned studies were not statistically significant. The high incidence of febrile morbidity recorded by Ijarotimi et al was largely attributed to Malaria.[3] Igwemadu et al also found no statistical difference in the incidence of febrile morbidity in the two groups (11.8% vs 11.1%). [20]

In this study, there was a 1% incidence of urinary tract infection (UTI) in the long course group while none was recorded in the short course group; however, the difference was not statistically significant. The diagnosis of urinary tract infection was made when the patient complained of dysuria, urinary frequency, and associated supra-pubic tenderness, and confirmed by urine culture and sensitivity. The affected participant recovered on treatment with Amoxycillin/clavulanic acid. This finding differs from that of Shah et al,[18] which showed an incidence of 2.3% in the short-course group and 1.6% in the long-course group, and that of Ijarotimi et al with an incidence of 6% vs 4% respectively.[3] Mohammed et al recorded an incidence of 6.4% vs 5.3% (short course vs long course antibiotics respectively).[21] The differences were not statistically significant in all these studies as was also observed in our study.

Our study did not record any incidence of endometritis in either group. This is in contrast to the findings by Ezeike et al, [22] Adaji et al,[23] Shah et al,[18] and Ijarotimi et al,[3] which showed a post-caesarean section endometritis incidence of 0.4% vs 1.6%, 4.3% vs3.6%, and 3% vs 2%, for the short- and long-course groups respectively, but the differences were not statistically significant. However, Igwemadu et al recorded a statistically significant difference in endometritis between the short-course and long-course groups (0.0% vs 6.1%, P=0.028).[20] The observed differences in the incidences of endometritis in this study and other similar studies may be due to the difficulty in diagnosing sub-clinical endometritis. This is further buttressed by the relatively higher incidence recorded by Alekwe et al with 14% incidence in the short-course group and 15% in the long-course using the microbiological criteria to define endometritis.[24] The exclusion criteria employed in our study may also explain the observed difference.

Our study showed that 4 participants had post-operative wound infection (3 in Group A and 1 in Group B). There was, however, no statistically significant difference between the two groups (p=0.31). All 4 cases of wound infection were superficial incisional wound infections with no wound dehiscence, with 2 each following elective and emergency caesarean section. They resolved on treatment with additional antibiotics and wound dressing. Higher incidences of post-operative wound infection were reported by Ezeike et al (12.2% vs 12.8%) and Adaji et al (1.3% vs 3.3%). [22,23] However, their studies employed a different methodology in the administration of the antibiotics from ours which employed the WHO Guidelines Development Group recommendations on prophylactic antibiotics use.[25-27] Our study also utilized sterile disposable drapes for the surgery in addition to the timing of prophylactic antibiotics administration.

Of the 4 patients that had post-Caesarean surgical site infection, 75% of them developed the infection after having been discharged from the hospital while 25% developed the infection while on admission. This would suggest that the post-discharge hygiene of patients could be a factor in post-Caesarean wound infection. The commonest offending organisms were Escherichia coli (75%) and Staphylococcus aureus (25%) with antibiotic sensitivity to Amoxicillin/clavulanic acid among other antibiotics. This was similar to the findings in other studies where Escherichia coli and Staphylococcus aureus were the leading isolates.[23,28,29]

In this study, participants in Group A spent an average of ₦758 on the single dose of ceftriaxone as the cost of antibiotics while those in Group B spent an average of ₦7,153 on antibiotics taken for 7 days. This meant that the cost of peri-operative antibiotics in the short-course group was less than 10% of the cost of peri-operative antibiotics in the long-course group and this difference was statistically significant. The difference in the cost of hospital care for post-Caesarean section patients essentially remains the difference in the cost of antibiotics. This was similar to the findings in similar studies.[3,18-23]

In our study, there was no significant difference in the clinical outcome in emergency versus elective caesarean sections. This finding is similar to those recorded in previous studies but is in contrast to the traditionally held belief that emergency procedures are associated with higher rates of infections than elective procedures.[18,22,23] This might largely be due to the exclusion of emergency cases with significant added risks of infection from the study.

The strength of the study was the fact that unlike other studies comparing short and long-course prophylactic antibiotics for caesarean section follow-up with full blood count was done twice in the first 2 weeks of the caesarean section. Apart from using the WBC

count as surveillance of possible infectious morbidity in the patients, a comparison of the WBC count values in the two groups in the first week and the second week ((p-value of 0.91 vs p-value of 0.60) further strengthened the finding that there was no statistical difference in the occurrence of clinical and sub-clinical infectious morbidities in the two groups. This tended to increase the power, strength, and credibility of this study.

CONCLUSION

This study shows that short-course prophylactic antibiotics are as effective as long-course antibiotics in preventing infections after a caesarean section. A single dose of ceftriaxone is recommended for patients with no significant infection risk, as it is also more cost-effective.

Limitations of the study.

The study participants were not blinded and there was some level of anxiety and concern in some participants randomized into the short course group and a few of them opted out of the study and had to be replaced by other consenting participants. Some of the participants could not keep up with the twice-a-week follow-up for the first two weeks despite the provision of a token to cover the cost of transportation. The second sample for the full blood count could not be taken for this category of participants. They were, however, contacted on the phone and almost all of them had at least two visits within the first two weeks of being discharged from the hospital as well as the 6-week post-natal check.

REFERENCES

1. Vejnovic TR, Costa SD, Ignatov A. A new technique for caesarean section. Geburtshilfe Frauenheilkd. 2012;72(9): 840-845.doi: 10.1055/s-0032-1315347.PMCID: PMC4168533. PMID: 25328165.
2. Kotaska A. Caesarean section or vaginal delivery in the 21st century. www.euro.who.int>_data>assets>pdf_file. No 81. 2015.(Accessed on 11thJuly, 2020)
3. Ijarotimi AO, Badejoko OO, Loto OM, Orji EO, Fasubaa OB. Comparison of short versus long term antibiotic prophylaxis in elective caesarean section at the Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria. Niger Postgrad Med J.2013; 20 (4):325-330.
4. Owens CD, Stoessel K. Surgical site infections: Epidemiology, Microbiology, and Prevention. J Hosp Infect. 2008; 70(2): 3-10. doi 10:1016/50195-6701(08) 60017-1.
5. WHO Recommendations for prevention and treatment of maternal peripartum infections. World Health Organization. September 2015. Available at www.who.int/reproductivehealth/publications/maternal_perinatal_health/peripartum-infections-guidelines. Accessed on 15thJune, 2020.
6. Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK et al. Clinical practice guidelines for antimicrobial prophylaxis in surgery. Am J Health Syst Pharm. 2013;70(3):195- 283. doi: 10.2146/ajhp120568.PMID:23327981.
7. Smaill FM, Grivell RM. Antibiotic prophylaxis versus no prophylaxis for preventing infection after caesarean section. The Cochrane Database of Systematic Reviews. 2014; (10): cd 007482. Doi: 10.1002/14651858.CD007482.pub3.PMID:25350672; PMCID: PMC8078551.
8. Global Guidelines for the prevention of surgical site infections.2nd edition. Geneva. World Health Organization; 2018.License: CC BY-NC-SA 3.0 IGO.
9. American Society of Health-System Pharmacists (ASHP). Therapeutic guidelines on antimicrobial prophylaxis in surgery. Am J Health-Syst Pharm. 1999; 56:1839-1888.
10. Mishra S, Raheja A, Agarwal K, Ghandhi G. Antibiotic prophylaxis in cesarean sections: a tertiary care hospital-based survey. Int J Reprod Contracept Obstet Gynecol 2021; 10: 2221-2224
11. Khan Z, Ahmed N, Zafar S, Ur Rehman A, Ullah Khan F, Saqlai M, et al. Audit of antibiotic prophylaxis and adherence of surgeons to standard guidelines in common abdominal surgical procedures. East Mediterr Health J.2020;26(9):1052-1061. doi: 10.26719/emhj.20.025. PMID:33047796
12. WHO recommendation on prophylactic antibiotics for women undergoing caesarean section. Geneva: World Health Organization.;2021. Licence: CC BY-NC-SA 3.0 IGO. Available at http://apps.who.int/iris.
13. Ogbe E, Anzaku A, Ogbu I, Okwaraoha B. The practice of antibiotic prophylaxis for caesarean delivery among obstetricians and trainee obstetricians in Nigeria. J Adv Med and Pharmaceut Sci. 2016;10(4):1-8.
14. Ayukekbong JA, Ntemgwa M, Atabe AN. The threat of antimicrobial resistance in developing countries: causes and control strategies. Antimicrob Resist Infect Control 2017; 6:47. https://doi.org/10.1186/s13756-017-0208-x.
15. Pederson TK, Blaaker J. Antibiotic prophylaxis in caesarean section. Acta Obstetrica Gynaecologica, Scandinavica. 1996; 75:537-539.
16. Global Action Plan on antimicrobial resistance. Geneva: World Health Organization; 2015.WHA68/2015/REC/1, Annex 3. ISBN 978 92 4 150976 3.
17. Zhong B. How to calculate sample size in randomized controlled trial. J Thorac Dis. 2009; 1(1):51-54. PMID:22263004; PMCID: PMC3256489.
18. Shah Z, KshirsagarN, Sahh S.H. Comparison of single-dose prophylactic antibiotics versus five days antibiotic in Cesarean section. J Evol Med Dent Services. 2014;3(12):3123-3129.
19. Shakya A, Sharma J. Comparison of single versus multiple doses of antibiotic prophylaxis in reducing post-elective Caesarean section infectious morbidity. Kathmandu Univ J(KUMJ).2010;8(30):179-84. doi: 10.3126/kumj.v8i2.3554. PMID:21209531
20. Igwemadu GT, Eleje GU, Eno EE, Akunaeziri UA, Afolabi FA, Alao AI et al. Single dose versus multiple-dose antibiotics prophylaxis for preventing caesarean section postpartum infections: A randomized controlled trial. Women's Health (Lond). 2022; 18:17455057221101071.

doi:10.1177/1745505722101071. PMID:35670414; PMCID: PMC9178729.
21. Mohammed SO, Shuaibu SA, Gaya SA, Rabiu A. The efficacy of Two doses versus 7 Day course of prophylactic antibiotics following Caesarean section: An experience from Aminu Kano Teaching Hospital. Annals of Afr Med. 2020;19(2):103-112. doi: 10.4103/aam.aam_39_19.
22. Ezeike AC, Agboghoroma OC, Efetie ER, Durojaiye KW. Comparison of short-course versus long-course antibiotic prophylaxis for caesarean section: A Randomized Controlled Trial. West Afr J of Med. 2021;38(4): 398-404.
23. Adaji JA, Akaba GO, Isah AY, Yunusa T. Short versus long term antibiotic prophylaxis in Caesarean section: A randomized clinical trial. Niger Med Jour 2020; 61:173-179.
24. Alekwe LO, Kuti O, Orji EO. Comparison of Ceftriaxone versus triple-drug regimen in the prevention of caesarean section infectious morbidities. J Matern Fetal Neonatal Med. 2008;21(9):638-642.
25. Ajekweneh A, Eifediyi RA, Okome GBO, Momoh M, Ikheloa JI, Okogbenin SI. Evaluating pre-incision versus post-umbilical cord clamping antibiotic prophylaxis in the prevention of post caesarean section infections in a Nigerian Specialist Teaching Hospital. Int J of Gynaecol and Obstet Res: 2015; 3:26-38.
26. Dlamini LD, Sekikubo M, Tumukunde J, Kojjo C, Ocen D, Wabule A et al. Antibiotic prophylaxis for caesarean section at a Ugandan hospital: a randomized clinical trial evaluating the effect of administration time on the incidence of postoperative infections. BMC Pregnancy Childbirth. 2015;15:91-99. doi: 10.1186/s12884-01514-3. PMID: 25884350; PMCID: PMC4417223.
27. American College of Obstetricians and Gynaecologists. Antibiotic prophylaxis for gynaecologic procedure. ACOG Practice Bulletin No 104. Obstet Gynecol. 2009;113:1180-1189.
28. Jido TA, Garba D. Surgical site infection following caesarean section in Kano, Nigeria. Ann Med Health Sci Res. 2012; 2(1):33-36.
29. Agboeze J, Onoh RC, Umeora OU, Onyebuchi AK, Ukaegbe CI, Egbuji C et al. Microbiology pattern of post caesarean wound infection at Federal Teaching Hospital, Abakaliki. Afr J Med Health Sci. 2013;12: 99-102.