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Efficacy of Piroxicam versus Diclofenac as Component of Multimodal Analgesic for Post Caesarean Section Analgesia

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Abstract

Background: Postoperative pain is unavoidable after caesarean section. It constitutes a big challenge to the patient's recovery and maternal-infant bonding. The importance of adequate pain control cannot be over emphasized. A multimodal approach to post caesarean section pain control has been shown to enhance analgesia but the right combination of analgesics is yet to be determined. **Objective**: To compare the efficacy of Pentazocine and Piroxicam versus Pentazocine and Diclofenac for post caesarean section analgesia within the first 24 hours. **Method**: Eligible participants undergoing elective caesarean section at Alex Ekwueme Federal University Teaching Hospital Abakaliki (AEFUTHA) and St Patrick's Mile 4 Hospital Abakaliki were randomized into two groups, A and B, of 54 participants each. Group A received a single dose of intramuscular Piroxicam 20 mg, while group B received two doses of intramuscular Diclofenac 75 mg given 12 hours apart. Participants in both groups also received intramuscular Pentazocine 30 mg 6 hourly for 24 hours. The first dose of the drugs was administered immediately after skin closure. Control of postoperative pain within the first 24 hours after caesarean section was assessed using a visual analogue scale. Data was analyzed using IBM SPSS. A p-value < 0.05 was considered statistically significant. **Results:** The mean VAS scores were significantly lower in the diclofenac group than in the piroxicam group at rest (diclofenac group 1.7 ± 0.9, piroxicam group 2.7 ± 1.3; p-value < 0.0001) and with movement (diclofenac group 2.2 ± 1.0, piroxicam group 3.5 ± 1.4; p-value < 0.0001). The diclofenac group also expressed a higher level of satisfaction than the piroxicam group (diclofenac group 49%, piroxicam group 34%; p-value = 0.001). There was no significant difference in the side effects (p-value = 0.35). Ten (18.5%) out of the 54 participants in the piroxicam group required further analgesia compared to 3 (5.6%) out of 54 in the diclofenac group. The

difference was not statistically significant (p-value = 0.07). **Conclusion:** Multimodal analgesic combination of pentazocine-diclofenac was found to be superior to pentazocine-piroxicam and was associated with a higher level of maternal satisfaction.

Subject Areas

Gynecology, Obstetrics

Keywords

Pentazocine, Piroxicam, Diclofenac, Post Caesarean Analgesia

1. Introduction

Caesarean section is the commonest major abdominal surgery performed by obstetricians [1]. Globally, the rates of caesarean section are progressively increasing, particularly among developing countries [1]. Incidence varies from country to country and within a country [2]. Rates as high as 32.9% had been reported in the United States, 58.1% in the Dominican Republic [2] and 30.7% in Abakaliki, South-East Nigeria [3]. Despite the improved safety of caesarean section, it is still associated with some complications [4]. One of these complications is postoperative pain.

Postoperative pain is inevitable following major surgeries like caesarean section and should be adequately treated to prevent significant morbidity that could delay patients' recovery and early return to daily activities [5]. Early recovery is especially important for a patient who is expected to give her newborn early care shortly after a caesarean section [5]. Consequences of poorly managed postoperative pain include patients' discomfort and suffering, reduced level of satisfaction, and prolonged convalescence. Others include prolonged hospital stay, increased cost of healthcare services and risk of developing chronic pain [5] [6]. Patients delivered by caesarean section have more compelling reasons to achieve optimal postoperative pain control [5]-[7]. Poorly controlled post caesarean pain may constitute a unique challenge to early ambulation, breastfeeding, and maternal-infant bonding. This might among others lead to thrombo-embolic events, uterine sub-involution and postpartum haemorrhage as well as stress on the healthcare systems [5]-[7].

There is no 'gold standard' for post caesarean pain management [7] [8]. An ideal post caesarean analgesic regimen should be cost-effective, safe for the mother and baby as well as minimally, if at all, secreted into the breast milk [9]. Such an analgesic should be simple to administer, require minimal monitoring and have minimal impact on staff workload [4]. Other factors such as patients' and physicians' preferences, institutional protocols, financial considerations, maternal health conditions and drug availability also influence the choice of the an-

algesic regimen [7]-[9]. In the developing countries like Nigeria, drug availability and cost remain important considerations in the choice of postoperative analgesics [10].

Despite improved understanding of pain pathophysiology, advances in pain management approaches, and other focused initiatives aimed at improving pain-related outcomes in recent decades, patients still suffer from different degrees of postoperative pain [6]. Several analgesics have been used to provide post caesarean section analgesia. Opioids administered via various routes such as Morphine, Pethidine, Tramadol and Pentazocine are the most commonly used class of drugs for post caesarean analgesia [9] [11]. However, opioid analgesics can be associated with complications such as respiratory depression, sedation, postoperative nausea and vomiting and psychotomimetic symptoms [9] [11]. These complications may prolong hospital stay and increase health care costs. Non-steroidal anti-inflammatory drugs (NSAIDs) such as Piroxicam, Diclofenac, and Ketoprofen can also be used [9]-[13]. They have side effects such as bleeding problems, gastro duodenal ulceration and renal insufficiency [9]-[13].

However, as there is no ideal postoperative analgesic, multimodal analgesia is currently well accepted for effective postoperative pain control including post caesarean section pain control [9] [11]. It is achieved by combining different analgesics that act by different mechanisms and at different sites in the neural pathway resulting in an additive or synergistic effect, hence reducing total doses of analgesics, and fewer side effects [8] [9]. But finding the right combination of analgesics constitutes a big challenge [8]. In Nigeria and most centres in the developing world, the two most commonly used opioids are Tramadol and Pentazocine [8]. These drugs are mostly used as unimodal analgesics [8]. Where they are used as components of multimodal analgesics, they are mostly combined with NSAIDs such as Piroxicam or Diclofenac [8] [10]. The combination of parenteral opioids (e.g. Pentazocine) and NSAIDs (e.g. Piroxicam or Diclofenac) provides a form of multimodal analgesia, with the benefits of both analgesic and anti-inflammatory actions [8] [10]. The long-acting effect of Piroxicam especially makes it suitable for daily dosing in the immediate postoperative period [8].

At the study centre, there is no consensus on post caesarean section analgesia among the obstetricians thereby allowing the use of different multimodal analgesic methods such as Pentazocine and diclofenac commonly, pentazocine and paracetamol and rarely pentazocine and piroxicam in the first 48 hours post operatively.

There is a paucity of studies on this subject matter in Nigeria and particularly South-Eastern Nigeria. Piroxicam differs in character from other NSAIDS in that it has a longer half-life (50 hours) due to its extensive protein binding ability [12]. This leads to daily dosing and thus provides a longer duration of analgesia and less injection trauma to patients compared to other NSAIDS [12]. Studies have shown effective pain control, safety and well accepted mode of analgesia after caesarean section with Piroxicam-Pentazocine combination and further work sug-

gested [8] [12]. Piroxicam is readily available in our environment, accessible, cheap, safe to the mother and baby as well as minimally expressed in breast milk, likewise Diclofenac. Despite all these benefits, Piroxicam is still not commonly used as Diclofenac as a component of multimodal analgesia for post caesarean pain control in our setting.

Thus, the purpose of this study is to compare the efficacy and safety of Pentazocine/Piroxicam (long acting agent) versus Pentazocine/Diclofenac when used as multimodal analgesics in the first 24 hours after caesarean section. The findings of this study may be of help in developing a local protocol for post caesarean section analgesia in Abakaliki and other resource poor settings.

2. Materials and Methods

2.1. Study Design

This was an open label randomized controlled study.

2.2. Study Background

The study was done at the Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA), Ebonyi state. Ebonyi state is one of the 5 southeastern states. It was created in 1996 and is inhabited predominantly by the Igbo tribe. Abakaliki is the state capital. The state has a population of about 3 million people and occupies a land mass of 5932 kilometers square. Majority of the inhabitants engage in subsistence farming, petty trading and civil service as their occupation. Literacy level generally is low while poverty is prevalent among this population.

Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA) was established in December 2011 following the merger between the defunct Federal medical Centre, Abakaliki and the then Ebonyi State University Teaching Hospital, Abakaliki. It receives referrals from all parts of the state and neighboring states.

St. Patrick's Mile 4 Hospital, Abakaliki was established in 1948. It is a missionary hospital. It runs a busy obstetric unit.

2.3. Study Population

Participants for this study were drawn from the population of women admitted for elective caesarean sections at the Alex Ekwueme Federal University Teaching Hospital, Abakaliki and St Patrick's Mile 4 Hospital, Abakaliki who met the inclusion criteria.

2.4. Inclusion Criteria

1) Pregnant women carrying live singleton fetus at 37 - 42 weeks' gestational age.

2) Consenting parturients who had elective caesarean section, under spinal anaesthesia.

3) American Society of Anaesthesiologists (ASA) I-II physical status.

2.5. Exclusion Criteria

1) Caesarean sections under general or epidural anesthesia.
2) Known allergy to Pentazocine, Diclofenacand or Piroxicam.
3) Patients with uncontrolled hypertension/pre-eclampsia or eclampsia.
4) Multiple gestation.
5) History of peptic ulcer disease, asthma.
6) Patients with chronic pain or on long term opioids.
7) Women with dead fetuses or fetuses with congenital abnormalities.
8) Patients who are unable to rate the pain due to psychiatric illness or illiteracy.
9) Parturients with severe obstetric haemorrhage, and sickle cell haemoglobinopathy.
10) Those that declined consent to participate in the study despite adequate counselling.

2.6. Sample Size Determination

The minimum sample size was determined using the formulafor non-inferiority study design for continuous data: [14] $N = 2 \times (z_{1-\alpha} + z_{1-\beta}/\delta_0)^2 \times S^2$

$S^2 = P_1(1 - P_1) + P_2(1 - P_2)$ [15].

N = number of patients per group.

Z = the standard normal deviate for a one or two sided study, set at 1.96.

δ_0 = clinically acceptable margin of error which will be set at 30%.

S^2 = variance of the difference in the expected satisfaction of the participants that received Pentazocine/Piroxicam group and Pentazocine/Diclofenac combination.

P_1 = expected participants' satisfaction using Pentazocine/Piroxicam combination = 89.2% [8].

P_2 = expected participants' satisfaction using Pentazocine/Diclofenac combination= 87.1% [10].

α = type I error = ≤ 5%.

β = type II error = ≤ 10% (90% power).

$S^2 = 0.892\ (0.108) + 0.871\ (0.129)$

$= 0.2087.$

Therefore,

$$N = \frac{2 \times (1.96 + 1.28)^2 \times 0.2087}{(0.30)^2}$$

$= 2 \times 116.64 \times 0.2087$

$= 48.69 = 49$ participants per group.

This represents the number of patients per group. Ten percent of this minimum sample size was added to correct for any attritions that may occur in the course of this study. The actual sample size on each arm of the study was 54 while the total was 108.

2.7. Study Duration

The study lasted for a period of five months, from January 11, 2020 to June 8,

2020.

2.8. Randomization and Allocation

Participants were randomized using a software randomizer. A set of fifty four numbers were randomly generated from a pool of one hundred and eight numbers and assigned to Group A (Pentazocine/Piroxicam group – study group) while the remaining set of fifty four numbers was assigned to Group B (Pentazocine/Diclofenac-control group). Group A received a single dose intramuscular Piroxicam 20 mg. Group B received 2 doses of intramuscular Diclofenac 75 mg 12 hours apart. The first dose of these drugs was administered immediately after skin closure. Both groups received intramuscular Pentazocine 30 mg 6 hourly for 24 hours. Tramadol was used as break through analgesic at patient's request or when VAS is >6.

2.9. Participants' Selection and Study Procedure

History and physical examination were conducted on all participants. The participants were reviewed by the anesthetists and the American Society of Anaesthesiologists (ASA) grading ascertained. Those that met the inclusion criteria were counseled on the details of the study. Those that give informed consent to participate in the study by signing the consent form were enrolled. Each patient was pre-loaded with intravenous normal saline or lactated Ringer's solution 20 ml/kg (up to 2000 ml) before induction of anaesthesia. Spinal anaesthesia was induced with 2 - 2.5 ml of 0.5% hyperbaric Bupivacaine via a 26 – gauge Whit acre needle at the L2-L3, L3-L4 or L4-L5 interspace in sitting position. After injection the patient was placed in supine position immediately and the operating table slightly tilted to the left. Standard monitoring of the patient during surgery was done according. All uterine repairs were with vicryl 2 sutures. Anterior abdominal wall repair was with vicryl 2 for rectus sheath, vicryl2/0 for subcutaneous tissue while skin closure was with either subcuticular skin closure technique using vicryl 2/0 or simple mattress suturing technique with nylon 2/0. The first dose of either Diclofenac or Piroxicam was administered immediately after skin closure. All the participants also received intramuscular Pentazocine 30 mg 6 hourly for 24 hours with the first dose given immediately after skin closure. All the intramuscular drugs were administered at the outer upper quadrant of the buttocks with a size 23 G needle gauge. The participants were thereafter monitored and required information gathered filled in the proforma and kept safe to be used for analysis. Rescue analgesia was provided with intramuscular Tramadol100 mg on request or when VAS is >6.

2.10. Postoperative Pain Assessment

Postoperative pain control was assessed using a visual analog scale (VAS). Each participant was taught the VAS at the enrolment and her understanding of VAS assessed with examples. The VAS shown below uses a 10 cm-long scale marked

from 0 - 10, where 0 represents 'no pain' and 10 represents 'worst possible pain'. Score of 1 - 4 are classified as mild pain, 5 to 8 as moderate pain and above 8 as severe pain. The participant were told to make a mark on the horizontal line between 0 and 10 to indicate how much pain she feels. This was then measured from 0 to where the participant marks the line to determine her pain score using a ruler. The researcher or research assistants undertook the assessment at 1st, 6th, 12th, and 24th hours after the surgery both at rest and with movement (turning from one side to the other on bed) (See Figure 1).

How severe is your pain now? Place a vertical mark on the line below to indicate how bad you feel your pain now.

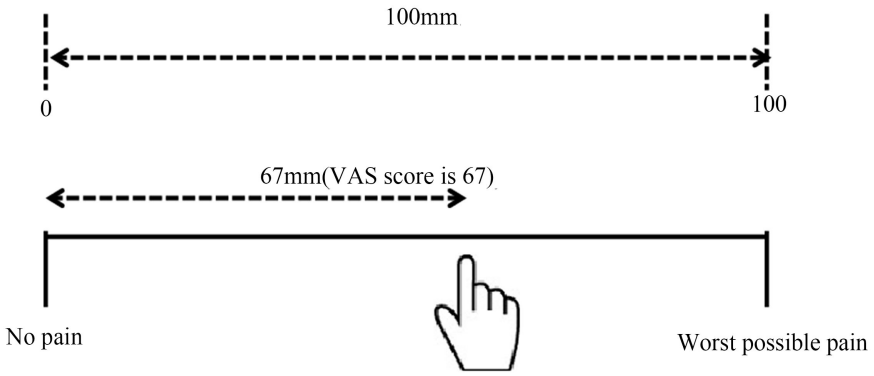

Figure 1. Visual analogue scale.

2.11. Assessment of Secondary Outcome Measures

The researcher or research assistant assessed the secondary outcomes. The incidence of epigastric pain, nausea and vomiting was assessed by asking the participants whether they experience any episode of epigastric pain, nausea, or vomiting during 24 hours postoperative period.

Participants' satisfaction was assessed using Likert scale of 5. The ranking of the satisfaction was as "very unsatisfied", "unsatisfied", "neither unsatisfied nor satisfied", "satisfied", "very satisfied". Participants were asked to indicate their level of satisfaction with the postoperative analgesia at the 24th hour postoperative time. The scores of the rankings were as follows: very unsatisfied-1, unsatisfied-2, neither unsatisfied nor satisfied-3, satisfied-4 and very satisfied-5. The mean dose of the rescue analgesic used was calculated.

2.12. Outcome Measures

Primary Outcome Measure:

Postoperative pain (at rest and with movement) during the first 24 hours.

Secondary Outcome Measures:

1) Incidence of side effects (epigastric pain, nausea and vomiting) within first 24 hours.

2) Participants' satisfaction at the 24th hour postoperative time.

3) Need for rescue analgesic (intramuscular tramadol 100 mg).

2.13. Statistical Analysis

Data were collated, tabulated and then statistically analyzed using Statistical Package for Social Science (IBM SPSS) software (version 24, Chicago II, USA). Continuous variables were presented as mean and standard deviation (Mean ± 2 SD), while categorical variables were presented as frequencies and percentages. Chi-square test (or Fisher's exact test where applicable) was used for comparison between groups for categorical variables while student t test was used for comparison between groups for continuous variables. Multiple linear regressions was used as appropriate to control for confounding measures. A difference with a P value <0.05 was considered statistically significant.

2.14. Ethical Considerations

Ethical clearance was obtained from the Health Research and Ethics committee of the Alex Ekwueme Federal University Teaching Hospital with registration number FETHA/ REC /VOL 2/2019/293. The study was registered with clinicaltrial.gov, registration number as NCT06943092.

3. Results

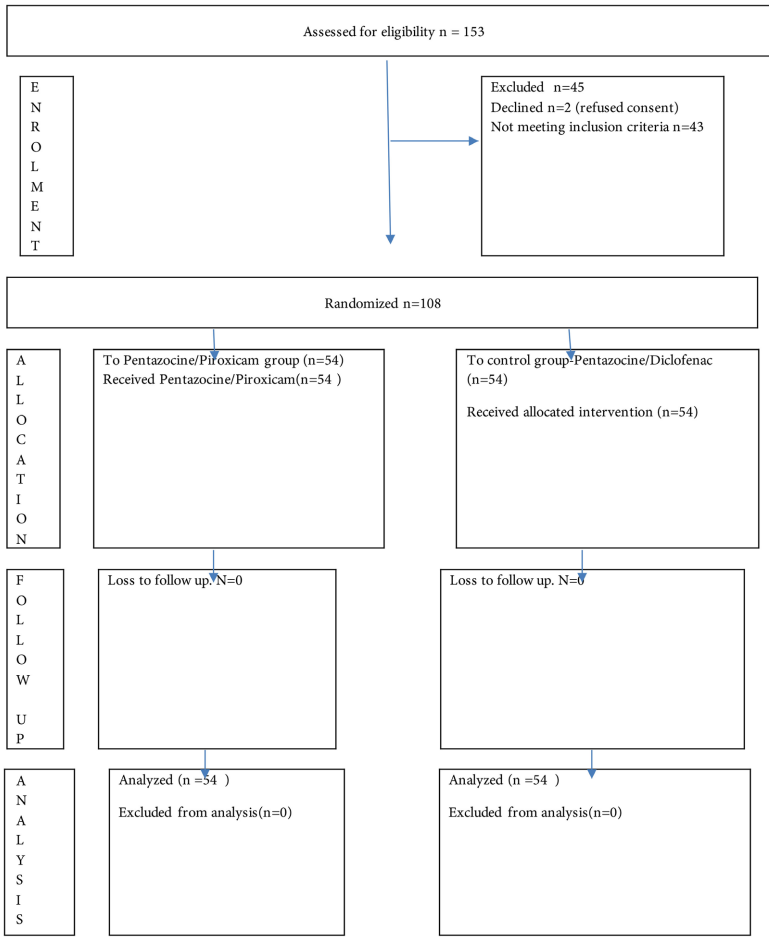

Figure 2. Consort flow chart.

One hundred and fifty three (153) women were assessed for eligibility. Out of these women, 45 were excluded. One hundred and eight women participated fully in the study as shown in the study flow chart above (Figure 2). Analysis was by intention to treat.

Table 1. Socio-demographic/obstetric characteristics of the participants.

Variables	Piroxicam group n (%)	Diclofenac group n (%)	χ^2	P value
Maternal age (years)				
<20	1 (1.9)	1 (1.9)		
20 - 34	30 (55.6)	39 (72.2)	3.363	0.186
≥35	23 (42.6)	14 (25.9)		
Parity				
1 (primipara)	13 (24.1)	10 (18.5)		
2 - 4 (multipara)	34 (63.0)	40 (74.1)	1.696	0.428
≥5 (grandmultipara)	7 (13.0)	4 (7.4)		
Marital status				
Married	53 (98.0)	53 (98.1)		
Single	1 (1.9)	1 (1.9)	0.000	1.000
Level of education				
Primary	2 (3.7)	2 (3.7)		
Secondary	19 (35.2)	20 (37.0)	0.041	0.980
Tertiary	33 (61.1)	32 (59.3)		
Previous uterine scar				
Yes	30 (55.6)	29 (53.7)		
No	24 (44.4)	25 (46.3)	0.037	0.847
Tribe				
Igbo	53 (98.1)	54 (100)		
Hausa	0	0		1.000
Yoruba	0	0		
Others	1 (1.9)	0		
Mean Weight (kg) ± SD	82.9 ± 11.8	81.1 ± 12.7	t = 0.8	0.4444

Table 1 above shows the socio-demographic/obstetric characteristics of participants. This showed no significant difference in any of the parameters between the two study groups. Thus the participants in this study were similar in the above characteristics.

Table 2 shows the duration of caesarean section and the cadre of surgeons who performed the surgery among participants. There was no statistical significant difference in both parameters between the two study groups.

Table 2. Surgical profile of the study groups.

Variables	Piroxicam group N (%)	Diclofenac group N (%)	χ^2	P value
Duration of Surgery				
<60	10 (18.5)	14 (25.9)	0.857	0.355
≥60	44 (81.5)	40 (74.1)		
Cadre of surgeons				
Consultants	35 (64.8)	38 (70.4)	0.380	0.537
Senior Registrars	19 (35.2)	16 (29.6)		

Table 3. Postoperative pain scores at rest (Using VAS) between the two groups.

Variable	Piroxicam group Mean ± SD	Diclofenac group Mean ± SD	t test	P-value
1st hour VAS	2.65 ± 1.77	2.11 ± 2.19	1.4	0.16
6th hour VAS	2.98 ± 2.26	2.00 ± 1.50	2.6	0.01*
12th hour VAS	2.98 ± 1.90	1.56 ± 0.98	4.9	<0.0001*
24th hour VAS	2.38 ± 1.62	1.12 ± 0.75	5.2	<0.0001*
Composite scores**	2.7 (1.3)	1.7 (0.9)	4.7	<0.0001*

*statistically significant **24 hours average scores. VAS = visual analogue scale.

The mean postoperative pain scores at rest, using VAS at the 1st, 6th, 12th and 24th hours post operation for the two study groups were shown in Table 3 above. There was a significant increase in the postoperative pain score at rest associated with Piroxicam group (study group) at the 6th, 12th and 24th hour postoperative period. The two arms of the study were similar in the pain score at rest in the 1st hour postoperative period.

Table 4. Postoperative pain (VAS) scores with movement between the two groups.

Variable	Piroxicam group Mean ± SD	Diclofenac group Mean ± SD	t test	P-value
1st hour VAS	3.26 ± 2.01	2.44 ± 2.20	2.0	0.0459*
6th hour VAS	3.75 ± 2.48	2.40 ± 1.56	3.4	0.0010*
12th hour VAS	3.75 ± 2.02	2.14 ± 1.27	4.9	<0.0001*
24th hour VAS	3.31 ± 1.96	1.71 ± 1.12	5.2	<0.0001*
Composite scores**	3.5 (1.4)	2.2 (1.0)	5.8	<0.0001*

*statistically significant **24 hours average scores. VAS = visual analogue scale.

The mean postoperative pain scores with movement, using VAS at the 1st, 6th, 12th and 24th hours post operation for the two study groups were shown in Table 4 above. There was a significant increase in the postoperative pain score with movement associated with Piroxicam group (study group) at the 1st, 6th, 12th and 24th hour postoperative period.

Table 5. Incidence of postoperative side effects.

Variable	Piroxicam group n (%)	Diclofenac group n (%)	χ^2	p-value
No side effect	46 (85.2)	51 (94.4)	3.26	0.35
Nausea	4 (7.4)	1 (1.9)		
Vomiting	1 (1.9)	0 (0.0)		
Epigastric pain	3 (5.6)	2(3.7)		
Total	54 (100.0)	54 (100.0)		

The occurrence of maternal side effects between the two arms of the study did not show any significant difference as shown in Table 5 above. Thus, the incidence of side effects of the different analgesics were similar in both groups (p = 0.35).

Table 6. Level of satisfaction of participants on the postoperative analgesia.

Variable	Piroxicam group n (%)	Diclofenac group n (%)	χ^2	P-value
Level of satisfaction				
Very unsatisfied	0	0	14.4	0.001*
Unsatisfied	0	0		
Neutral	10 (18.5)	0		
Satisfied	34 (63.0)	49 (90.7)		
Very satisfied	10 (18.5)	5 (9.3)		

*statistical significance.

Table 6 shows the level of satisfaction of the participants with the postoperative analgesia. Majority of the participants in each group were satisfied with the postoperative analgesia they received. However, the level of satisfaction was significantly higher in the Diclofenac group (p = 0.001).

Table 7. Need for rescue analgesia between the two groups.

Rescue	Piroxicam group n (%)	Diclofenac group n (%)	χ^2	P-value
Yes	10 (18.5)	3 (5.6)	4.29	0.07
No	44 (81.5)	51 (94.4)		
Total	54 (100.0)	54 (100.0)		

There was an increased need for rescue analgesia to control pain in the Piroxicam (study) group compared to the diclofenac group but the difference was not statistically significant between the two groups as shown in Table 7 above (p = 0.07).

4. Discussion

The socio-demographic and obstetric characteristics of the two groups were sim-

ilar and there was no significant difference between the two groups.

In this study, the VAS scores were recorded at the 1st, 6th, 12th and 24th hour postoperative period and compared between the two groups. This is similar to the study by Egede et al that recorded VAS scores at 1st, 2nd, 6th, 12th, 18th and 24thhours postoperative period [10].

All the participants in both groups had a mean VAS scores within the mild pain range both at rest and with movement. The mean VAS scores continued to decrease over time within the first 24 hours postoperative period especially in the Diclofenac arm. The reduced mean VAS scores could be due to the different mechanisms and site of action of the opioid (Pentazocine) and NSAIDS (Diclofenac and Piroxicam), thereby producing synergistic effects. This further supports the efficacy of multimodal analgesics combination for post caesarean section analgesia as found in previous studies [8] [10] [12] [13].

Although, both Pentazocine-Diclofenac and Pentazocine-Piroxicam are potent analgesics, the Pentazocine-Diclofenac combination produced significantly better analgesic effects both at rest and with movement than the Pentazocine-Piroxicam combination. Generally, there is a paucity of studies in which these two methods of multimodal analgesia were compared for pain relief after caesarean section. However, some studies have compared the analgesic efficacy of the multimodal agents to a unimodal agent for post-caesarean section analgesia and the multimodal agents were found to be superior to the single agents being compared [8] [10] [12] [13].

Egede *et al.* in Abakaliki, studied the analgesic efficacy of intramuscular diclofenac and pentazocine compared to that of intramuscular pentazocine alone for pain relief after caesarean section as measured by the VAS scores. He found that the mean VAS scores were significantly lower in the multimodal analgesia group than in the single analgesia group, and concluded that multimodal analgesia was more effective than unimodal analgesia in relieving pain after caesarean section [10].

At rest, the VAS score showed a significant increase in the pentazocine-piroxicam group from the 6th to the 24th hour postoperative period but the increase was not significant in the 1st hour postoperative period ($p = 0.16$). However, with movement, the VAS score significantly increased in the pentazocine-piroxicam group from the 1st to the 24th hour postoperative period compared to the pentazocine-diclofenac group. Also Multiple regression analysis showed a significant difference in pain scores as stated above. The similarity in the VAS score seen in both groups at rest in the 1st hour postoperative period could be due to the effect of the regional anaesthesia which may still be present in the 1st postoperative hour masking the postoperative pain. However, the difference in the 6th hour VAS score is due to the fact that diclofenac has a faster duration of action and the sustained pain relief may be due to the drug dosing and the sustained diclofenac metabolites for up to 25 hours in the system [16] [17].

Few participants in both groups had side effects. This showed that the drugs

were well tolerated. Even though the side effect profile was higher in the pentazocine-piroxicam group, it was not statistically significant (p = 0.35). This was similar to the findings by Adeniji *et al.* and Egede *et al.* [8] [10]. This could be because of the exclusion of high risk patients in the study and the use of standard doses of the drugs.

Almost all the participants in both groups expressed satisfaction with the analgesics they received during the 24 hours post-operative period. This showed that both groups received potent multimodal analgesics combinations. However, there was higher level of satisfaction among participants that received Pentazocine-Diclofenac combination (pentazocine-diclofenac group 90.7%, Pentazocine-piroxicam group 63.0%; p = 0.001).

Few participants in both groups (piroxicam group 18.5%, diclofenac group 5.6%) had need for additional analgesia within the 24 hours postoperative period but the difference was not statistically significant (p = 0.07). It also showed that both groups received potent multimodal analgesics combinations.

5. Conclusion

This study showed that intramuscular pentazocine-piroxicam and pentazocine-diclofenac are safe and potent multimodal analgesic combinations for post caesarean section analgesia within the first 24 hours. However, pentazocine-diclofenac combination offered superior analgesic efficacy and a higher level of maternal satisfaction compared to pentazocine-piroxicam combination.

Funding

All the cost of the research was borne by the researcher.

Future Research

A larger sample size and multi centre study will be needed to increase the reliability of the study.

Conflicts of Interest

There was no conflict of interest declared.

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