Comparison of Analgesic Efficacy Between Acetaminophen and Ibuprofen After Circumcision

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Research Article

Comparison of analgesic efficacy between acetaminophen and ibuprofen after circumcision

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ABSTRACT

Purpose: The purpose of this study is to compare the analgesic efficacy between acetaminophen and ibuprofen after circumcision. **Methods:** A quasi-experimental approach was used to compare the analgesic efficacies of acetaminophen and ibuprofen by pain scale scoring and measurement of pain-free duration after administration. Thirty-six male children (5–12 years old) circumcised at Nur Hidayah Hospital, Yogyakarta, Indonesia, who fulfilled the inclusion criteria were included in the study. Half of the subjects were given 180 mg acetaminophen, while the other half received 180 mg ibuprofen after circumcision. The pain scale was scored using a visual analog scale after 1 h of administration. The pain-free duration was determined from administration until the subject felt pain. **Results:** Ibuprofen treatment was associated with a significantly lower pain level ($P < 0.05$) and longer pain-free duration ($P < 0.05$) than acetaminophen treatment after circumcision. **Conclusion:** Ibuprofen is more effective as an analgesic agent than acetaminophen after circumcision.

KEY WORDS: Acetaminophen, Analgesic efficacy, Circumcision, Ibuprofen

INTRODUCTION

Circumcision is a minor operation to open the foreskin so that the head of the penis remains permanently exposed.[1] In Australia, an estimated 70% of men have undergone circumcision.[2] Meanwhile, in countries with major Muslim populations, such as Turkey and Indonesia, the prevalence of circumcision is 99%.[3] Weiser and Strashin[4] reported that circumcision facilitates penile hygiene, prevents cancer of the penis, and decreases the incidence of genital herpes in later life.[4]

After circumcision, analgesics such as acetaminophen and ibuprofen should be taken to avoid pain/soreness.[4] In Indonesia, ibuprofen is widely available at a low price but is rarely used for analgesia after circumcision, while acetaminophen is widely used as an analgesic as well as an antipyretic in children. A review by Bailey *et al.*[5] indicated that ibuprofen is better at relieving pain than acetaminophen in cases of dental pain. However, no studies have investigated the use of ibuprofen as an analgesic after circumcision. Therefore, we examined whether there are differences in the analgesic efficacy of acetaminophen and ibuprofen after circumcision.

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MATERIALS AND METHODS

Study Subjects

This study used a quasi-experimental approach and received ethical approval from the Institutional Review Board of Nur Hidayah Hospital, Bantul, Yogyakarta, Indonesia (No. 501/EP-FKIK-UMY/XII/2015). The study population consisted of children who had undergone circumcision by electrocautery at Nur Hidayah Hospital, Bantul, Yogyakarta, Indonesia, selected based on the following inclusion criteria: (1) Young male, aged 5–12 years; (2) provided informed consent to participate; (3) had parent or guardian approval; and (4) had a normal penis without abnormalities. We use electrocautery method because no or minimal bleeding.[6] Subjects with infection, hemophilia, and/or allergy to any medication were excluded from the study. 36 subjects fulfilling the inclusion criteria were included in the study.

Assessment of Analgesic Efficacy

Half of the subjects were given 180 mg acetaminophen syrup, while the other half received 180 mg ibuprofen

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syrup after circumcision. The doses corresponded to 10 mg/kg body weight and were administered every 6 h. Pain intensity was measured 1 h after administration using a visual analog scale (VAS). More specifically, a line 10 cm in length was drawing on a paper and presented to each subject to correspond to the intensity of pain on a scale from no pain at all (0) to very painful (10). The duration of analgesic effect was defined after subject's VAS value mild to severe pain from drug administration.

Data Analyses

Due to the small sample size (<50) in this study, the Shapiro–Wilk test was used to determine the normality of data. Mann–Whitney non-parametric analyses were performed to test significance. SPSS ver. 21 for Windo was used for statistical analyses. In all analyses, $P < 0.05$ was taken to indicate statistical significance.

RESULTS

The results are shown in Table 1.

Based on the VAS, subjects treated with acetaminophen 1 h after circumcision experienced significantly higher levels of pain (7.27 cm) than subjects treated with ibuprofen (4.11 cm) ($P < 0.05$) [Table 1]. VAS values of 1–5 cm were considered to indicate mild-to-moderate pain, while higher VAS values of 6–10 cm were taken to indicate severe pain.[7] Subjects treated with ibuprofen showed a significantly longer pain-free duration than those treated with acetaminophen (mean value: 89.33 vs. 70.22 min, respectively; $P < 0.05$) [Table 1].

DISCUSSION

Ibuprofen is a commonly used nonsteroidal anti-inflammatory drug, which functions by reducing the levels of hormones that cause inflammation and pain in the body. The analgesic effect is achieved by inhibiting the action of the enzyme cyclooxygenase (COX), i.e., COX-1 and COX-2, which inhibits prostaglandin (PG) synthesis, thus blocking its effects on nerve endings. PGs act as mediators of inflammation and pain and cause vasodilation and edema. Ibuprofen also acts as an antipyretic by increasing vasodilation and blood flow in the hypothalamus.[8]

The inhibition of PG synthesis by acetaminophen occurs only in low-peroxide environments, while sites of inflammation usually contain large amounts of peroxides produced by leukocytes. This explains the weak anti-inflammatory effects of acetaminophen. Acetaminophen inhibits COX-3, an isozyme of COX-1 found only in the central nervous system.[9] Hence, ibuprofen may have a better analgesic effect than acetaminophen, which is what our results indicate. Ibuprofen administration resulted in a lower level of pain and longer average effect duration than acetaminophen administration, although both agents are absorbed rapidly by the body.[10-12]

Table 1: VAS and pain-free duration after circumcision

Treatment	*n*	Mean (average) value		SD
		VAS (cm)	Duration (min)	
Acetaminophen	18	7.27	70.22	0.83
Ibuprofen	18	4.11	89.33	0.90

VAS: Visual analog scale, SD: Standard deviation

Several studies have shown that acetaminophen and ibuprofen have the same analgesic effects in patients following dental surgery,[13] those with osteoarthritis pain,[14] and in children with acute middle ear infection.[15] However, our results are consistent with Pozzi and Gallelli,[16] who reported that ibuprofen has a stronger anti-inflammatory effect than acetaminophen.

Study Limitations

The main limitation of this study was the small sample size.

CONCLUSIONS

Ibuprofen was associated with lower levels of pain on the VAS and longer pain-free duration than acetaminophen in subjects after circumcision. Therefore, ibuprofen should be considered a superior analgesic agent for use after circumcision.

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