

A Prospective Double Blind Study Comparing Antipyretic and Analgesic Effect of Ibuprofen and Acetaminophen

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ABSTRACT

Background: Acetaminophen is a frequently used antipyretic drug because it is highly efficacious and safe to use. Ibuprofen is a Propionic acid derivative that inhibits prostaglandin biosynthesis. The present study was aimed to compare the effect of both the drugs in treating pain and fever which is associated with sore throat amongst adults.

Materials and Methods: The present study was conducted in the Department of Pharmacology, Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, India. The subjects aged between 32-45 years coming to the OPD of the hospital from the period of November 2014- October 2015 were included in the study. Patients were asked to rate their preoperative pain on a Heft-Parker visual analogue scale (VAS). The scale was divided into 4 categories. Patients also received a VAS to record their level of pain and a chart to record their temperature regularly for duration of 5 days. The data obtained from the study was analysed statistically using chi square test. P values of less than 0.05 were considered significant. SPSS software was used for analysis.

Results: There were majority of males in Acetaminophen group and females in ibuprofen group. The mean age of the subjects in Group I was 35.02 \pm 11.0 and in group II was 38.9 \pm 12.5 years. At day 0 the mean pain level in Group I and Group II was 82.40 \pm 41.19 and 76.40 \pm 45.66 respectively. At day 1 the mean pain level in Group I and Group II was 69.80 \pm 34.67 and 58.60 \pm 32.81 respectively.

Conclusion: The above study came to the conclusion that both acetaminophen and ibuprofen are efficacious antipyretics and analgesics.

KEYWORDS: Alleviating, Analgesic, Antipyretic Pharmacodynamic.

INTRODUCTION

Acetaminophen and ibuprofen are one of the widely used drugs for curing pain and fever amongst children and adults. These are regularly asked over the counter drugs but their safety and efficacy margins are not yet certain.¹ The pharmacodynamic profile of the drugs tends to vary with patient's age.^{2,3} Fever is regarded as a physiologic response of body to infectious or inflammatory agent but it is associated with uneasiness, therefore people prefer to take antipyretics to relieve their discomfort.⁴ Acetaminophen is a frequently used antipyretic drug because it is highly efficacious and safe to use.⁵ It is a Para amino phenol derivative and inhibits the cyclooxygenase enzyme and prevents release and creation of prostaglandins.⁶ Ibuprofen is a Propionic acid derivative that inhibits prostaglandin biosynthesis.² Paracetamol and ibuprofen are commonly used to treat

fever and pain. In case of analgesia for adults, ibuprofen has been found to be equally^{7,8} or more^{9,10} efficacious than acetaminophen. Various studies have been conducted to compare the antipyretic efficacy of the drugs amongst children and analgesic efficacy after dental treatment in adults. The present study was aimed to compare the effect of both the drugs in treating pain and fever which is associated with sore throat amongst adults.

MATERIALS AND METHODS

The present study was conducted in the Department of Pharmacology, Great Eastern Medical School & Hospital, Ragolu, Srikakulam, Andhra Pradesh, India. The subjects aged between 32-45 years coming to the OPD of the hospital from the period of November 2014-

October 2015 were included in the study. The study was approved by the institutional ethical board and all the subjects were informed about the study and a written consent was obtained in the vernacular language. The subjects not able to take medications orally, pregnant or lactating women, patients belonging to ASA III or ASA IV category were excluded from the study. Only ASA I or ASA II grade subjects were included in the study. All the demographic details of the subjects like gender and age were obtained from every subject that was included in the study. Patients were asked to rate their preoperative pain on a Heft-Parker visual analogue scale (VAS). The scale was divided into 4 categories - 0 mm that was regarded as no pain, between 0-54 mm was taken as mild pain, 54-114mm was regarded as moderate pain and pain more than or equal to 114 mm was taken

as severe pain. Patients with moderate to severe pain were the ones included in the study. Each patient after initial treatment was randomly divided into two groups- Group I (Ibuprofen) and Group II (acetaminophen). Group I patients were provided with 400 mg of brufen and group II patients were provided with 325 mg of acetaminophen. Three times daily dosage of the drug was prescribed. Antibiotics were also prescribed in each group depending upon the requirement. Patients were not allowed to take any other analgesic or antipyretic during the study. Patients also received a VAS to record their level of pain and a chart to record their temperature regularly for duration of 5 days. The data obtained from the study was analysed statistically using chi square test. P values of less than 0.05 were considered significant. SPSS software was used for analysis.

Table 1: Preoperative statistics for ibuprofen and acetaminophen group

	Ibuprofen Group (Group I)	Acetaminophen Group (Group II)	P Value
Subjects Analysed	45	45	>0.05
Gender			
Male	23	25	>0.05
Female	24	20	>0.05
Age (Mean +/- S.D.)	35.02+/- 11.0	38.9+/- 12.5	>0.05
Initial Pain (Mean +/- S.D.)	135.4+/-27.5	124+/- 28.3	>0.05

Table 2: Pain by day in both the groups.

Postoperative day	Ibuprofen group (Mean+/- SD)	Acetaminophen group (Mean+/- SD)	P value
Day 0	82.40 +/- 41.19	76.40 +/- 45.66	>0.05
Day 1	69.80 +/-34.67	58.60 +/- 32.81	<0.05
Day 2	39.67 +/-25.07	37.01+/- 30.78	>0.05
Day 3	15.83 +/-21.61	25.21 +/- 22.21	<0.05
Day 4	15.76 +/-16.34	15.89 +/- 15.40	>0.05
Day 5	6.04 +/- 12.93	7.30 +/- 13.41	>0.05

Table 3: Fever by day in both the groups.

Postoperative day	Ibuprofen group (Mean+/- SD)	Acetaminophen group (Mean+/- SD)	P value
Day 0	100.32 +/-2.12	100.62 +/- 1.98	>0.05
Day 1	99.87 +/- 1.33	100.01 +/- 1.21	>0.05
Day 2	99.01 +/- 3.1	99.98 +/- 3.34	>0.05
Day 3	98.60 +/- 1.22	99.34 +/- 2.10	>0.05
Day 4	98.00 +/- 1.09	98.60 +/- 1.76	>0.05
Day 5	98.40 +/- 1.88	98.10+/-1.11	>0.05

RESULTS

A total of 90 patients took part in the study. There were approximately 11 drop outs as these subjects fail to give a written evaluation of pain and fever.

Table 1 demonstrates the preoperative data regarding age, gender and initial pain status. A total of 90 subjects were included in the study. There were majority of males in Acetaminophen group and females in ibuprofen group. The mean age of the subjects in Group I was

35.02+/- 11.0 and in group II was 38.9+/- 12.5 years. The mean initial pain level in Group I was 135.4+/-27.5 and in Group II was 124+/- 28.3. There was no significant difference in the preoperative statistics between the two groups.

Table 2 describes the pain by day in both group I and Group II. At day 0 the mean pain level in Group I and Group II was 82.40 +/- 41.19 and 76.40 +/- 45.66 respectively. At day 1 the mean pain level in Group I

and Group II was 69.80 +/-34.67 and 58.60 +/- 32.81 respectively. There was a significant difference in pain levels at day 1 in both the groups. At day 3 the mean pain level in Group I and Group II was 15.83 +/-21.61 and 25.21 +/- 22.21 respectively. There was a significant difference in pain levels at day 3 in both the groups. There was no significant difference in the mean pain levels at Day 4 and 5 amongst Group I and Group II. In both the groups pain decreased with due course of time. Table 3 demonstrates the fever as recorded by the subjects. There was statistically no significant difference in the fever scale between both the groups. Fever also decreased with due course of time. At Day 0 the mean pain levels in Group I and Group II was 100.32 +/-2.12 and 100.62 +/- 1.98 respectively. At Day 1 the mean pain levels in Group I and Group II was 99.87 +/- 1.33 and 100.01 +/- 1.21 respectively. At Day 3 the mean pain levels in Group I and Group II was 98.60 +/- 1.22 and 99.34 +/- 2.10 respectively. At Day 5 the mean pain levels in Group I and Group II was 98.40 +/- 1.88 and 98.10 +/-1.11 respectively.

DISCUSSION

Ibuprofen and acetaminophen are generally used over the counter drugs for relief of pain and fever. The present study was done to evaluate their use as antipyretic and analgesic. In our study there was statistically no significant difference in the preoperative variables associated with the study. There were majority of males in Acetaminophen group and females in ibuprofen group. The mean age of the subjects in Group I was 35.02 +/- 11.0 and in group II was 38.9 +/- 12.5 years. The mean initial pain level in Group I was 135.4 +/-27.5 and in Group II was 124 +/- 28.3. Thus the effect of these variables is minimised in the study. The pain gradually decreased over the period of time which expected. This was in accordance with the natural course of the disease and immune response of the body. According to a study conducted by Simpson et al ⁶, the mechanism of action of acetaminophen is not clear. It is purposed to inhibit cyclooxygenase-1 and -2 enzymes and hence modulate the endogenous cannabinoid system by altering the metabolism to AM404. It is also thought to stimulate the descending serotonin pathways. The mechanism of acetaminophen is variable and might be complementary to ibuprofen therefore there is a potential for greater analgesic effects with the combination of both the drugs. But it is still unclear about the interaction of combination model with the peripheral mediators and central ones.

A study conducted by Menhinick et al¹¹ who compared the the difference in the pain levels after dental procedure. They used 600 mg of ibuprofen, 600 mg of ibuprofen/1000 mg of acetaminophen combination and a placebo amongst 57 patients. The results of the showed a significant difference in pain levels and they came to the

conclusion that combination of both the drugs is more effective as an analgesic. Merry et al¹² conducted a study to compare pain relief after extraction of tooth using acetaminophen and ibuprofen combination, acetaminophen alone and ibuprofen alone. They also found that combination of both the drugs was more efficacious in reducing pain. Both the study differed from our study in pain model as pain was of dental origin in both the cases. In our study, At day 0 the mean pain level in Group I and Group II was 82.40 +/- 41.19 and 76.40 +/- 45.66 respectively. At day 1 the mean pain level in Group I and Group II was 69.80 +/-34.67 and 58.60 +/- 32.81 respectively. There was a significant difference in pain levels at day 1 in both the groups. At day 3 the mean pain level in Group I and Group II was 15.83 +/-21.61 and 25.21 +/- 22.21 respectively. There was a significant difference in pain levels at day 3 in both the groups. There was no significant difference in the mean pain levels at Day 4 and 5 amongst Group I and Group II. In both the groups pain decreased with due course of time.

In a study conducted by Hollinghail¹³, acetaminophen and ibuprofen treatment was more efficacious in decreasing the body temperature than both alone. In a similar study conducted by Perrott et al showed single dose of acetaminophen had similar effects on control of pain when compared to ibuprofen but ibuprofen at a dose of 5 to 10 mg per kg had more antipyretic action in comparison to acetaminophen.¹⁴

CONCLUSION

The above study came to the conclusion that both acetaminophen and ibuprofen are efficacious antipyretics and analgesics. Their combination can prove to be more effective but there is a risk of interaction with the central and peripheral receptors.

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