



# Effectiveness of Pugun Tanoh Leaves Ethanol Extract (*Curanga fel-terrae* (Lour.) Merr) as an Anti-inflammation in Patients after Tooth Extraction at Dental and Mouth Hospital of Dentistry Faculty, Universitas Sumatera Utara

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## Abstract

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**BACKGROUND:** Pugun Tanoh (*Curanga fel-terrae* (Lour.) Merr) is one of the medicinal plants. *C. fel-terrae* often used by the Karo tribe of Tiga Lingga Village, Kabupaten Dairi, Provinsi Sumatera Utara to treat diarrhea, asthma, cough, scabies, inflammation, bruising, and abdominal pain. Hence, it is necessary to examine the anti-inflammatory effects of Pugun Tanoh leaf extract.

**AIM:** The present study aimed to determine the effectiveness of Pugun Tanoh leaves ethanol extract as an anti-inflammatory in patients after tooth extraction at Dental and Mouth Hospital of Dentistry Faculty, Universitas Sumatera Utara.

**METHODS:** There were two research groups, namely the treatment group, which was given the extract plus amoxicillin 500 mg and mefenamic acid 500 mg as well as the control group who were only given amoxicillin 500 mg and mefenamic acid 500 mg without the extract. However, the instructions given to the patient are only required to take 500 mg of amoxicillin as an antibiotic, but for the 500 mg mefenamic acid drug, it is only instructed to drink it if there is pain that is felt by the patient. After the extracted teeth, the treatment group was given *C. fel-terrae* leaves ethanol extract 1.1 mg/kg on the tooth extraction socket using a 3 ml syringe then measurements were made on day 1 and day 2 after the extract was given using a visual analog scale (VAS) and through direct observation. Statistical analysis using the t-test independent and Chi-square test (significant  $p < 0.05$ ).

**RESULTS:** The treatment group did not have signs of inflammation both on the 1<sup>st</sup> and 2<sup>nd</sup> days after tooth extraction, while the control group had signs of inflammation both on the 1<sup>st</sup> day and the 2<sup>nd</sup> day after tooth extraction. In the treatment group, there were no patients who took the mefenamic acid drug while in the control group, it was found that all patients took mefenamic acid because they felt post-extraction pain. Statistical result are obtained with  $p = 0.00$  ( $p < 0.05$ ).

**CONCLUSION:** *C. fel-terrae* leaves ethanol extract is effective to be used as an anti-inflammatory in patients after tooth extraction combined with amoxicillin 500 mg and mefenamic acid 500 mg.

## Introduction

The extraction of teeth causes injury to the soft tissue and hard tissue in the former extraction area [1]. Injuries that occur due to tooth extraction and/or surgery will experience a natural healing process by passing through the stages of the wound healing process. Basically, the stage is divided into 3, namely inflammation, proliferation, and remodeling [2]. This inflammation is characterized by local macroscopic changes in the presence of *rubor*, *tumor*, *calor*, *dolor*, and *functio laesa* [3]. Non-steroidal anti-inflammatory drugs and corticosteroids both have the ability to suppress signs and symptoms of inflammation. However, these two classes of drugs often cause adverse and harmful effects such as induction of gastric or peptic ulcer which is sometimes accompanied by anemia secondary to gastrointestinal

bleeding and impaired platelet function due to inhibition of thromboxane A2 biosynthesis due to prolonged bleeding time, hepatotoxic, and nephrotoxic. The use of traditional medicine is a rational choice [4]. *Curanga fel-terrae* is one of the medicinal plants. *C. fel-terrae* grows in Asian regions such as China, India, Indonesia, Philippines, Malaysia, and Myanmar. In Indonesia, these plants are spread in Sumatra, Java, Kalimantan, and Maluku. *C. fel-terrae* often used by the Karo tribe of Tiga Lingga Village, Kabupaten Dairi, Provinsi Sumatera Utara to treat diarrhea, asthma, cough, scabies, inflammation, bruising, and abdominal pain [5]. *C. fel-terrae* has many benefits for treating various diseases not only empirically proven but also scientifically. Several studies conducted by Juwita *et al.* showed that ethanol extract of *C. fel-terrae* leaves was able to relax the tracheal smooth muscle so that it was thought that this extract could be used as asthma medications [6]. In 2014 and 2015, the

study continued with hepatoprotective activity. It was proven that the ethanol extract of *C. fel-terrae* leaves at a dose of 125 mg/kg had hepatoprotective activity and had the same effect as catechins [7]. Acute toxicity, sub-chronic, and teratogenic tests have also been carried out so that the extract of *C. fel-terrae* leaves is safe for use in humans. Based on the acute toxicity test, there was no significant effect at a dose of 5000 mg/kg [8]. Based on the sub-chronic toxicity test for 90 days did not affect the hematological parameters of test animals [9]. Based on teratogen testing at a dose of 125 mg/kg, there was a significant change in weight loss, fetal number, fetal weight and size, hemorrhage, retarded growth, increased number of resorption fetuses, and dead fetuses. Therefore, in this study, the extract of *C. fel-terrae* is not used in pregnant women [10]. Anti-inflammatory effect test ethanol extract of *C. fel-terrae* leaves on male mice given orally at a dose of 10 mg/kg provides the same statistically anti-inflammatory effect with indomethacin dose 10 mg/kg [4]. Based on the data above, the purpose of this study was to determine the effectiveness of *C. fel-terrae* leaves ethanol extract as an anti-inflammatory in patients after tooth extraction at Dental and Mouth Hospital of Dentistry Faculty, Universitas Sumatera Utara.

## Materials and Methods

*C. fel-terrae* leaves ethanol extract that is already available from the USU Pharmacy lab was made by maceration method, carboxymethylcellulose (CMC), distilled water, glycerin, tampons (cotton wrapped in gauze becomes round), analytical balance, mortar and Stamford, 3 ml syringe, visual analog scale (VAS) measuring instruments, Nirbeken, digital weight scales, USU Pharmacy laboratory glassware.

### Preparation of 0.5% CMC Na

0.5% CMC NA is made to dissolve the ethanol extract of Pugun Tanoh leaves so that it becomes a preparation in the form of a suspension. A total of 0.5 g of CMC Na powder are weighed then sprinkle into a mortar containing 10 ml of distilled water, then cover and leave for 15 min until a transparent mass is obtained, crushed, and then diluted with distilled water and put into a 100 ml measuring flask, add distilled water to the mark line.

### Preparation of *C. fel-terrae* leaves ethanol extract suspension

In this study, the extract was made in the form of a suspension so that it can be easily applied to the tooth extraction socket. Preparation of suspension of *C. fel-terrae* leaves ethanol extract was carried out as follows: Weighing 2.31 g of *C. fel-terrae* leaves ethanol extract, then put in a mortar and added 0.5% CMC Na,

stirred until homogeneous then put in a 30 ml measuring flask then add glycerin to the mark line.

### Data collection method

1. This study was carried out in the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Sumatera Utara. All the participants voluntarily participated in this study. Written consent was obtained from each individual. This study was ethically approved by the institutional ethical committee. The inclusion criteria of this study were patients extracting lower first molars and female patients who were not pregnant. While the exclusion criteria of this study were patients with tooth extraction with flap surgery and experienced complications after tooth extraction
2. Then, researchers measure the weight of patients with digital weight scales
3. The patient will then undergo a tooth extraction procedure that will be carried out by the clinical clerk student
4. The researcher prepared a suspension of ethanol extract of *C. fel-terrae* leaves 1.1 mg/kg
5. For the treatment group, after the extracted teeth were given a suspension of ethanol extract of *C. fel-terrae* leaves 1.1 mg/kg on the tooth extraction socket using a 3 ml syringe then instructed to bite the sterile tampon
6. In the control group, subjects were instructed to bite sterile tampons
7. Tampons will be bitten for 60 min after extraction after that the tampons are released in both groups
8. Both groups were given a complementary drug in the form of amoxicillin 500 mg and mefenamic acid 500 mg. The instructions given to the patient are only required to take 500 mg of amoxicillin as an antibiotic but for the 500 mg mefenamic acid drug it is only instructed to drink it if there is pain that is felt by the patient
9. Measurements were made on the 1<sup>st</sup> and 2<sup>nd</sup> days after extracting using VAS to assess pain (*dolor*) and through direct observation to assess redness (*rubor*), heat (*calor*), and swelling (*tumor*).

## Results

### Pain (*dolor*) distribution based on VAS value

The sample of the study based on the inclusion criteria was 36 people (Table 1). Distribution of pain (*dolor*) based on the value of VAS in the control group for the 1<sup>st</sup> day, there were 2 patients with VAS 2 values, 3 patients with VAS 3 values, and so on. While in the

**Table 1: Distribution of research samples**

Group	Amount	Percentage
Treatment group	18	50
Control group	18	50
Amount	36	100

control group for the 2<sup>nd</sup> day, there were 2 patients with VAS 1 values, 6 patients with VAS 2 values, and so on. In the treatment group for the 1<sup>st</sup> day, the entirety of patients were with VAS value 0. It was the same for the 2<sup>nd</sup> day with VAS value 0 (Table 2).

**Table 2: Distribution of VAS values for each group**

VAS value	Treatment group		Control group	
	Day 1	Day 2	Day 1	Day 2
0	18	18	0	0
1	0	0	0	2
2	0	0	2	6
3	0	0	3	4
4	0	0	3	3
5	0	0	10	3
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
Amount	18	18	18	18

\*VAS value=0 (no pain), VAS value=1-3 (mild pain), VAS value=4-6 (moderate pain), VAS value=7-10 (severe pain). VAS: Visual analog scale.

Based on the data in Table 2, it can be seen that in the treatment group, all patients did not experience pain (*dolor*) after tooth extraction. While in the control group, all patients experienced pain (*dolor*) after tooth extraction. In the control group for the 1<sup>st</sup> and 2<sup>nd</sup> days, on average, patients experienced pain with a VAS score of 3.5278 with a standard deviation of 1.31987. While in the treatment group, there were no patients who experienced pain. Then obtained the results of  $p = 0.000$  ( $p < 0.05$ ), it can be concluded that the ethanol extract of *C. fel-terrae* leaves has a significant effect in terms of preventing pain (*dolor*) on the examination of the 1<sup>st</sup> and 2<sup>nd</sup> days (Table 3).

**Table 3: Statistical test results of t-test independent statistics on pain (*dolor*)**

Group	Mean ± SD	p
Treatment	0.0000 ± 0.0000	0.000*
Control	3.5268 ± 1.3198	

Description: \*Significant relationship ( $p < 0.05$ ).

### Distribution of redness (*rubor*) marks on the first and second days

All control group patients at the 1<sup>st</sup> and 2<sup>nd</sup> days after tooth extraction experienced signs of redness (*rubor*) while in the treatment group, patients did not experience redness on the 1<sup>st</sup> day or the 2<sup>nd</sup> day after tooth extraction (Table 4).

**Table 4: Distribution of redness (*rubor*) marks on the 1<sup>st</sup> and 2<sup>nd</sup> days**

Redness ( <i>rubor</i> )	Treatment group		Control group	
	Day 1	Day 2	Day 1	Day 2
Have	0	0	18	18
Not have	18	18	0	0

Based on the results of the Chi-square statistical test can be obtained  $p = 0.000$  ( $p < 0.05$ ), it can be concluded that the ethanol extract of *C. fel-terrae* leaves has a significant effect in terms of preventing the sign of redness (*rubor*) in patients after tooth extraction (Table 5).

**Table 5: Chi-square statistical test results on the sign of redness (*rubor*)**

Redness mark ( <i>rubor</i> )	Treatment group	Control group	p
Have	0	18	0.000*
Not have	18	0	

Description: \*Significant relationship ( $p < 0.05$ ).

### Distribution of heat (*calor*) on the 1<sup>st</sup> and 2<sup>nd</sup> days

All control group patients at the 1<sup>st</sup> and 2<sup>nd</sup> days after tooth extraction experienced heat (*calor*) while in the treatment group, patients did not experience heat (*calor*) on the 1<sup>st</sup> day or the 2<sup>nd</sup> day after tooth extraction (Table 6). Based on the results of the Chi-square

**Table 6: Distribution of heat (*calor*) on the 1<sup>st</sup> and 2<sup>nd</sup> days**

Heat ( <i>calor</i> )	Treatment group		Control group	
	Day 1	Day 2	Day 1	Day 2
Have	0	0	18	18
Not have	18	18	0	0

statistical test can be obtained  $p = 0.000$  ( $p < 0.05$ ), it can be concluded that the ethanol extract of *C. fel-terrae* leaves has a significant influence in terms of preventing heat (*calor*) in patients after tooth extraction (Table 7).

**Table 7: Chi-square statistical test results on heat (*calor*)**

Heat ( <i>calor</i> )	Treatment group	Control group	p
Have	0	18	0.000*
Not have	18	0	

Description: \*Significant relationship ( $p < 0.05$ ).

### Distribution of swelling (*tumor*) on the 1<sup>st</sup> and 2<sup>nd</sup> days

All control group patients on examination of the 1<sup>st</sup> and 2<sup>nd</sup> days after tooth extraction experienced swelling (*tumor*) while in the treatment group, patients did not experience swelling (*tumor*) on the 1<sup>st</sup> day or the 2<sup>nd</sup> day after tooth extraction (Table 8). Based on the

**Table 8: Distribution of swelling (*tumor*) on the 1<sup>st</sup> and 2<sup>nd</sup> days**

Swelling ( <i>tumor</i> )	Treatment group		Control group	
	Day 1	Day 2	Day 1	Day 2
Have	0	0	18	18
Not have	18	18	0	0

results of the Chi-square statistical test can be obtained  $p = 0.000$  ( $p < 0.05$ ), it can be concluded that the ethanol extract of *C. fel-terrae* leaves has a significant effect in preventing swelling (*tumor*) in patients after tooth extraction (Table 9).

**Table 9: Chi-square statistic test results on swelling (*tumor*)**

Swelling ( <i>tumor</i> )	Treatment group	Control group	p
Have	0	18	0.000*
Not have	18	0	

Description: \*Significant relationship ( $p < 0.05$ ).

## Discussion

Based on the research that has been done, it was found that there was a difference between the treatment groups given ethanol extract of *C. fel-terrae* leaves and the control group which was not given ethanol

extract of *C. fel-terrae* leaves. The treatment group which was given ethanol extract of *C. fel-terrae* leaves did not have signs of inflammation both on the 1<sup>st</sup> and 2<sup>nd</sup> days after tooth extraction, while the control group which was not given ethanol extract of *C. fel-terrae* leaves had signs of inflammation both on the 1<sup>st</sup> day and the 2<sup>nd</sup> day after tooth extraction. It can be concluded that the ethanol extract of *C. fel-terrae* leaves is effectively used as an anti-inflammatory in patients after tooth extraction. The results of this study are similar to the previous research conducted by Juwita in 2009 in male mice. The results of statistical tests were performed using independent t-test statistics to assess pain (*dolor*) and Chi-square statistical tests to assess signs of redness (*rubor*), feeling of heat (*calor*), and swelling (*tumor*) showed a significant difference between groups the treatment was given ethanol extract of *C. fel-terrae* leaves and the control group which was not given ethanol extract of *C. fel-terrae* leaves. The pain sensation experienced by each individual varies depending on emotional conditions and previous emotional experiences, so in the control group, there was a difference in pain (*dolor*) [11]. Ethanol extract of *C. fel-terrae* leaves contains flavonoids, tannins, glycosides, saponins, and steroids/triterpenoids [6]. Compounds that have anti-inflammatory effects are flavonoids, tannins, and steroids/triterpenoids. Steroid/triterpenoid compounds have anti-inflammatory effects because can inhibit the enzymatic work of phospholipase, thus preventing the release of inflammatory mediators, namely, arachidonic acid and its metabolites such as prostaglandins, leukotrienes, prostacyclin, and thromboxane [4]. Based on Sukmawati *et al.* research in 2015, flavonoids in the body inhibit the lipo-oxygenase enzyme that plays a role in leukotriene biosynthesis. Flavonoids also inhibit the secretion of lysosomal enzymes which are inflammatory mediators which inhibit the proliferation of the inflammatory process. Tannin has the potential as anti-inflammatory because it has antioxidant activity, so it inhibits reactive oxidants such as hydroxy (OH) radicals and hypochlorous acid either directly or through inhibition of the production of oxidants (O<sub>2</sub>) by neutrophils, monocytes, and macrophages [12].

## Conclusion

*C. fel-terrae* leaves ethanol extract is effective to be used as an anti-inflammatory in patients after tooth extraction combined with amoxicillin 500 mg and mefenamic acid 500 mg.

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## Authors' Contributions

Dr. Hendry Rusdy has supervised the experiment and reviewed the article. Marianne M. Si gave the concept and design of this study. All the practical work was done by Baginda Mangatur Gurning. The writing and editing were done by Dr. Hendry Rusdy, Marianne M. Si, and Baginda Mangatur Gurning.

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