

# Cacao Extract vs Oral Morphine as An Analgesic : Study in Mice (*Mus musculus*)

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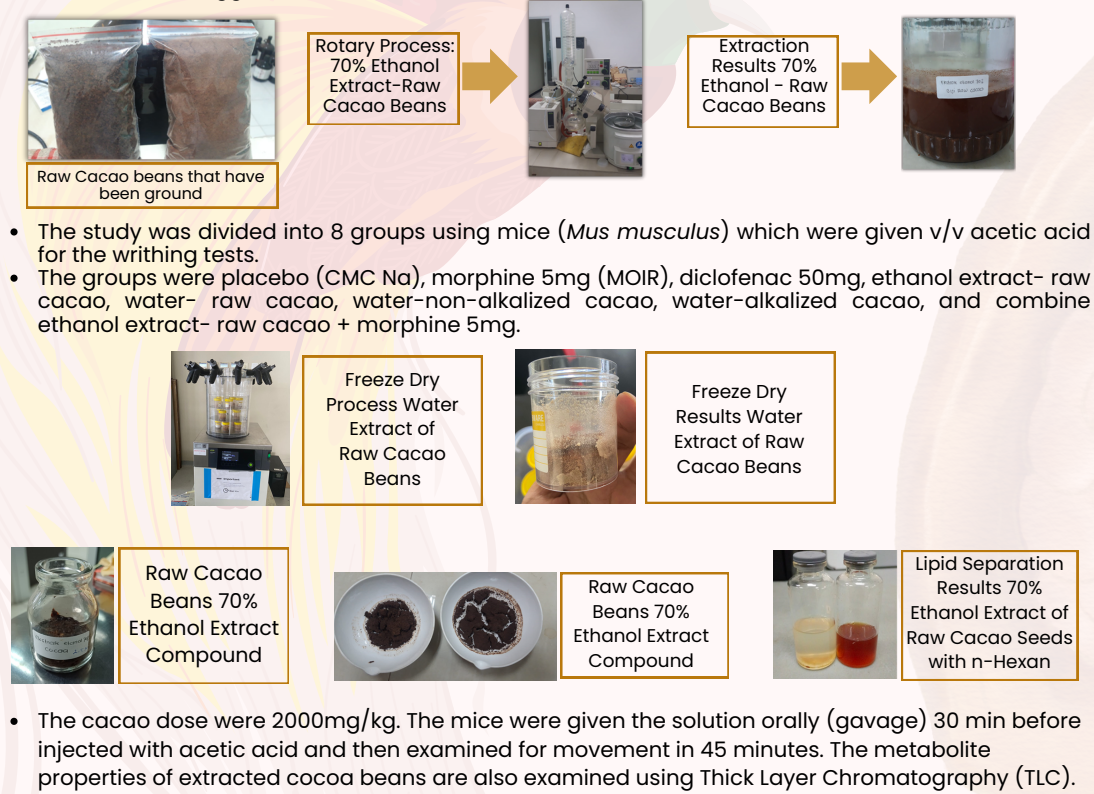
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## Background and Aims :

Integrative medicine is a treatment that involves both non-pharmacological and pharmaceutical approaches. Indonesia is the number 7th for producing Theobroma cacao in the world. Theobroma cacao as well known as chocolate, is believed to have analgesic effects from its metabolites such as flavonoids, alkaloids, xanthine (theobromine, caffeine), polyphenols, and tryptophan. The expected research output includes the most current discoveries in the use of cacao extract as an adjuvant for oral morphine, which has been the major therapy for cancer pain in the form of articles. This is a pilot research to give the most sophisticated pain treatment for cancer patients utilizing natural ingredients. It is expected that cacao bean industrialization in Indonesia would provide economic value not only as a chocolate snack but also as a medicinal material.

## Methods :

- This study used raw cacao beans from the Jember Coffee and Cacao Research Centre (Puslitkoka).
- The beans were obtained from one batch (location, types and harvested season).
- They were fermented in natural process under the sunlight, then processed and extracted with 70% ethanol and distilled water in Natural Product Medicine Research and Development lab in UniversitasAirlangga.



- The cacao dose were 2000mg/kg. The mice were given the solution orally (gavage) 30 min before injected with acetic acid and then examined for movement in 45 minutes. The metabolite properties of extracted cocoa beans are also examined using Thick Layer Chromatography (TLC).

## Results :

### Information

**K1 :** Negative control group given CMC-Na 0.5%

**K2 :** The positive control group was given morphine at a human dose of 5 mg

**K3 :** The positive control group was given Na-diclofenac at a dose of 40 mg/kgBW

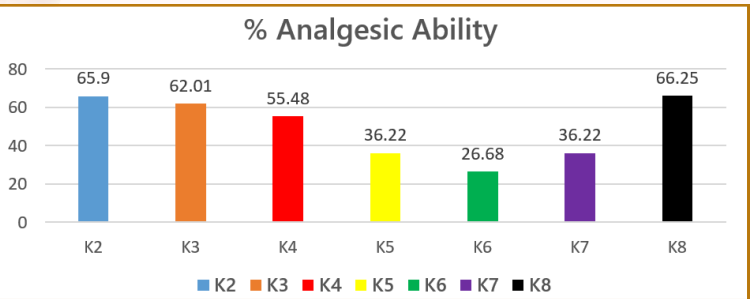
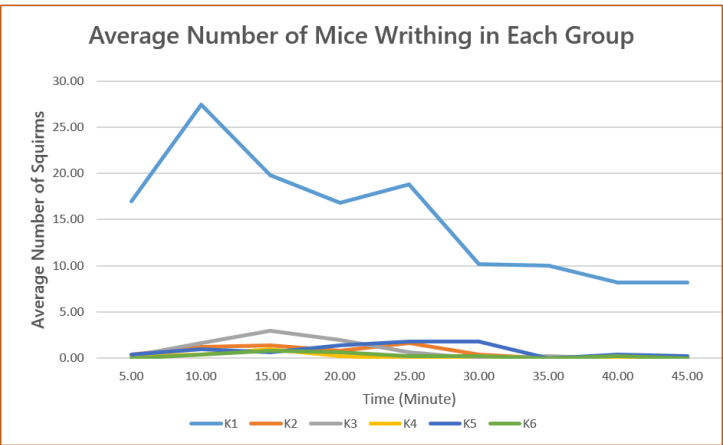
**K4 :** The treatment group was given a 70% ethanol extract of raw cocoa beans at a dose of 2 g/kgBW

**K5 :** The treatment group was given raw cocoa bean water extract at a dose of 2 g/kg BW.

**K6 :** The treatment group was given Cacao Cake Alkalized Water Extract at a dose of 2 g/kg BW

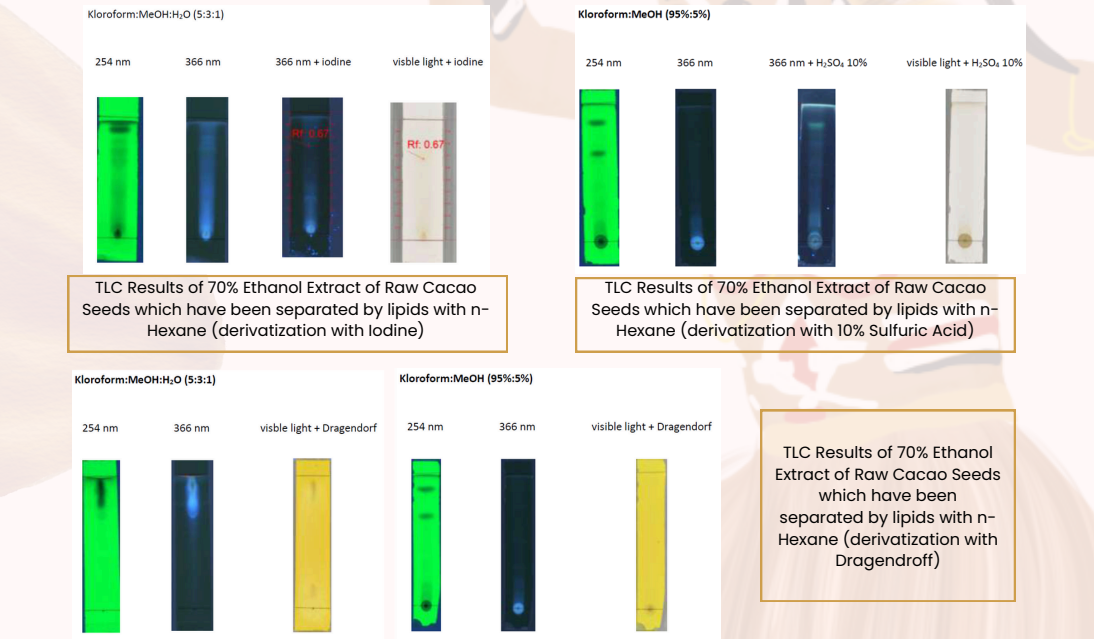
**K7 :** The treatment group was given non-alkalized cacao cake water extract at a dose of 2 g/kg BW

**K8 :** The treatment group was given a combination of 5 mg of human morphine and 70% ethanol extract of raw cocoa beans at a dose of 2 g/kg BW.



## Statistics :

The combination of ethanol extract-raw cacao + morphine had the best analgesic efficacy (66.25%) when compared to the positive control group of morphine (65.9%) and diclofenac (62.01%). This combination also significantly improved the efficacy of raw cacao bean extract as an adjuvant for oral morphine when compared to ethanol extract-raw cacao, which only provided an analgesic effect of 55.48%, and water-raw cacao, which provided an analgesic effect of 36.22%. However, the group water-non-alkalized cacao exhibited the same analgesic effectiveness as water-raw cacao, 36.22%. This was higher than the water-alkalized cacao (26.68%).



## Conclusions :

According to this research, raw cacao beans have strong analgesic potential. This is demonstrated by the efficacy of ethanol extract-raw cacao administered as an adjuvant & as a single dose to mice given acute discomfort with 1% v/v acetic acid. When ethanol extract-raw cacao was combined with morphine, which is a definitive therapy for individuals with severe pain, the efficacy was enhanced. This opens up the possibility of developing novel treatments based on natural products, as cacao is a common daily food. This study is only concerned with the potentiation of the effects of cocoa bean extract as a food-based analgesic. TLC analysis of cacao beans found that theobromine and caffeine content dominated the metabolite compounds that may act as pain killer agents. Further study into chemical characterization, molecular identification, toxicity, and active metabolite features is still being conducted to determine the specific mechanism of action of compounds that serve as analgesics.

