

Original Article

# The Experimental Study of *C. Papaya* Leaf Extract & Its Effect on the Platelet Count: A Potential Treatment of Dengue Patients

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**Abstract:** Plants have a variety of uses, especially in medicinal aspects, they have phytochemicals which have effects on the human body. People in rural areas used the decoction method and mechanical pounding method in preparing the plant extracts. People usually choose not to go to drugstores to purchase drugs, which sometimes is costly. This experimental study aimed to determine the effects of fresh young papaya leaf extracts of different varieties on the platelet count of white mice. In this study, *C. papaya*, commonly known as the papaya plant, was extracted through a mechanical or pounding method and was force-fed to white mice once every 24 hours for three to six consecutive days. After each treatment, blood specimens were taken, and platelet count was analyzed. Results showed that there was a significant increase in the platelet count of white mice treated with *C. papaya* extract compared to that of the controlled white mice fed with water. Furthermore, results showed that the affectivity of *C. papaya* extract is observable after the third day of treatment. It is hermaphroditic and produces high-quality fruits with excellent flavors. The flesh color depends on the strain. Canaries stated that Red Lady papaya is a supreme papaya with bright orange sweet fruits, 1-3 kg each, mostly seedless. Red Lady papaya trees produce fruit on average nine months from seed. It is a hermaphrodite cultivar of average height, tolerant to papaya ring spot virus. Papain is the most abundant and most active. One important fact to take note of is that these two enzymes gradually vanish as the fruit ripens. So, in order to avail the benefits, pick your fruit when it is still green. Apart from aiding the digestion process, other papaya enzyme benefits include treating oedema, inflammation and wounds.

**Keywords:** *C. papaya* leaf extract, effect, platelet

## 1. INTRODUCTION

Plants have a variety of uses, especially in medicinal aspects. They have phytochemicals which have effects on the human body. People in rural areas used the decoction method and mechanical pounding method in preparing the plant extracts. People usually choose not to go to drugstores to purchase drugs, which sometimes is costly [1]. A large and increasing number of patients use medicinal herbs or seek the advice of their physician regarding their use. Increasing interest in medicinal herbs has increased scientific scrutiny of their therapeutic potential and safety, thereby providing physicians with data to help patients make wise decisions about their use [2]. There are many other Philippine medicinal plants, herbs and trees found in the country, but they are actually rarely used as herbal medicine. These Philippine medicinal plants are an economical alternative medicine to treat many ailments, which is beneficial to many Filipinos, especially in

this economic crisis [3]. These herbal medications are similar to over-the-counter medicine [4]. Moreover, one of the Philippine medicinal plants is the *Carioca papaya*. *Carioca papaya*, commonly called “papaya/papayas” in the region. One of its many uses is as a hemostatic agent, arresting bleeding. Dengue patients have been alleviated from worsening conditions by using *Carioca papaya* since the use of *Carica papaya* increases blood platelets, which is efficient in blood clotting, preventing haemorrhage of the internal organs, which can lead to death [5]. According to the Philippines Bureau of Plant Industry [6], *Carioca papaya* is found throughout the Philippines in cultivation and semi cultivation-in many regions thoroughly naturalized at low and medium altitudes [7]. The situation was introduced from tropical America and is now pantropic in distribution. Stuart stated that *Carica papaya* is an erect, usually branchless tree with a soft greyish trunk marked with scars. Leaves, borne on the top, are long-stalked, rounded and deeply lobed. Flowers, male in clusters and female, are sessile. Fruit exists ovoid, yellow-orange when ripe with numerous pellet-sized black seeds [8]. According to Stuart *Carica papaya* is considered antirheumatic and anthelmintic; it contains many biologically active compounds; two important ones are chymopapain and papain, believed to aid digestion, varying in an amount in the fruit, latex, leaves and roots; phenolic compounds remain higher in male trees than female; leaf, fruit, stem and root contains papain, phytokinase, malic acid, and calcium maleate; fresh latex had this chymopapain; leaves contain caprice (alkaloid), carp side (glycoside), saccharide (0.85%), dextrose (2.6%), laevulose (2.1%) and citrates; volatile oil is contained from seeds; seeds are also considered anti-inflammatory, anthelmintic, analgesic, stomachic and antifungal; leaves are also used as tonic, stomachic and analgesic; roots are analgesic. According to Sinha, papaya enzyme health benefits come from papain and chymopapain, the two very important enzymes of the fruit [9]. These enzymes aid in the digestion of protein in the body. Out of the two, papain is the most abundant and greatest active. One important fact to take note of is that these two enzymes gradually vanish as the fruit ripens. So, in order to avail the benefits, pick your fruit when it is still green. Apart from aiding the digestion process, other papaya enzyme benefits include treating oedema, inflammation and wounds [10]. The antioxidant nutrients, such for example vitamin C, vitamin E and beta-carotene, also aid in reducing any inflammatory symptoms [11]. Thus, people with asthma, osteoarthritis and rheumatoid arthritis would find great relief with an increase in the consumption of this fruit [12]. The enzymes papain and chymopapain also prevent cornea scar deformation and help in treating insect stings. Varieties. According to Ballesteros, the Solo Variety usually refers to the Hawaiian strain and is so-called because one fruit is adequate for one serving per person. It is hermaphroditic and produces high-quality fruits with excellent flavors. Flesh color depends arranged the strain. Canarius stated that Red Lady papaya is a supreme papaya with bright orange sweet fruits, 1-3 kg each, mostly seedless [13]. Red Lady papaya trees produce fruit on average nine months from seed. It is a hermaphrodite cultivar of average height, tolerant to papaya ring spot virus. As stated by peony farmers, Waimanalo is a high-quality variety with orange-yellow flesh, each fruit weighing from one-half to one kilo [14]. This study aimed to determine the effects of fresh young papaya leaf extracts from different varieties on the platelet count of white mice [15].

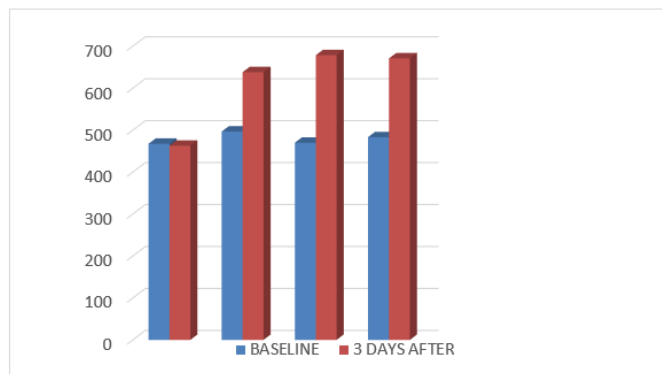
## 2. MATERIALS & METHOD

The methodology describes the materials needed in the experiment and narrates the procedure followed in experimenting. Part Three, Data Gathering and Analysis, presents the statistical method used to analyze the data gathered. Purpose of the Study and Research Design This experimental study aimed to determine the effect of different extracts from different varieties of *C. papaya* on the platelet count of white mice. In this study, Randomized Complete Block Design (RCBD) will be used as an experimental design. Securing White Mice Cages made of chicken wire (1 for each replicate) was required to secure the white mice. These

cages were purchased from a reputable source. To make sure that variation in the subject is minimized, name tags (1 for each white mouse) are used. Securing of *C. papaya* a clean container was used for securing the young *C. papaya* leaves during the experiment. Young *C. papaya* leaves were freshly picked from the lower portion of the *C. papaya* tree every day during the span of the experiment. Extraction by Mechanical or Pounding Method A mortar and pestle, a measuring cup or a tablespoon, and cheesecloth are the materials used for the extraction of *C. papaya* by mechanical or pounding method. Introduction of *C. papaya* for the introduction of *C. papaya*, gloves and syringes were essential. Blood Extraction from White Mice For the blood extraction from white mice, surgical scissors and slides were needed. The platelet counting included slides and a microscope. Purchase of White Mice the white mice were purchased from a reputable source. The mice were of the same size and the same age. This was obtained as the mice were from the same parent. After the mice were obtained, they were acclimatized at the venue of the experiment at Topaz, Capes. Extraction of *C. papaya* by Mechanical or Pounding Method the extracts were obtained mechanically by pounding the young leaves of *C. papaya* using mortar and pestle. The obtained extract was strained using clean cheesecloth and then introduced freshly to white mice. Forced feeding was the method used in introducing *C. papaya* to white mice. It was done once every 24 hours for 3 consecutive days. The dosage of the extracts administered to white mice was calculated by proportioning the body figure of the white mice to that of a human and the usual amount of extracts administered to a person. The mouse was first exposed to a light bulb for 10 minutes in order to warm the body and facilitate increased blood circulation of mouse. The mouse was then placed halfway in a plastic tube (usually a graduated cylinder), and a small portion of the tip of its tail was cut using surgical scissors. The tail was held over a slide for collection of at least 2 drops of blood. The blood was smeared and stained. Blood extraction was done before and after the introduction of *C. papaya* extract to white mice. There was one blood extraction after the introduction of *C. papaya* extract to white mice after 3 days. The blood collected from the white mice was submitted to a medical technologist at Medicos Diagnostic Center, Lapis, and Iloilo City. The platelets were counted and recorded before and after treating the mice with *C. papaya*. The platelet count before the introduction of *C. papaya* was used as the baseline for the platelet count of the white mice, while the platelet count of the white mice after the introduction of *C. papaya* was obtained from the data of the effect of the *C. papaya* on the platelet count of white mice. The data gathered were analyzed using a Paired Sample t-test and Analysis of Variance (ANOVA).

### 3. RESULTS & DISCUSSION

Descriptive Data Analysis deals with the presentation, analysis and interpretation of the platelet count of white mice when fed with young leaf extracts from different varieties of *C. papaya* after three days of treatment. Inferential Data Analysis provides the test result on the significant difference in the platelet count of white mice fed with young leaf extracts from different varieties of *C. papaya* and controls white mice fed with water. The experiment was conducted to determine the platelet count of white mice using a mechanical method. Figure shows the relationship of the platelet count of white mice in accordance with the four treatments. The mechanical method uses three different varieties of *C. papaya* and the control treatment. Furthermore, it shows the increase of platelet count of white mice in treatment A from  $496.67 \times 10^3/\mu\text{L}$  to  $638 \times 10^3/\mu\text{L}$ , in treatment B from  $460 \times 10^3/\mu\text{L}$  to  $678.44 \times 10^3/\mu\text{L}$ , treatment C from  $483.11 \times 10^3/\mu\text{L}$  to  $670.89 \times 10^3/\mu\text{L}$  after introduction of *C. papaya* leaf extract in three consecutive days. In the control treatment, it changed from  $467.56 \times 10^3/\mu\text{L}$  to  $462.78 \times 10^3/\mu\text{L}$ .



**Figure 01.** Average Platelet count of white mice before and after introduction of *C. papaya*.

Table 1 shows the Paired Sample T-test result of the different treatments comparing the baseline platelet count and the platelet count 3 days after exposure of white mice. It shows that the baseline and the platelet count after three days have no significant difference in the control group and the white mice under Variety A shown by their sig. Value of 0.3 and 0.09, respectively. In groups under Variety B and C, there is a significant difference in their baseline and their platelet count after three days shown by their sig. Value of 0.04.

**Table 01:** Significant Difference in the Platelet Count of White Mice Before and After Introduction of *C. papaya* extract.

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Control	baseline - 3 days after	4.78	12.88	4.29	-5.12	14.68	1.11	8.00	0.30
Var A	BSELINEA - POSTA	-141.33	217.82	72.61	-308.76	26.10	-1.95	8.00	0.09
Var B	BSELINEB - POSTB	-208.44	255.72	85.24	-405.01	-11.88	-2.45	8.00	0.04
Var C	BSELINEC - POSTS	-187.78	231.70	77.23	-365.88	-9.68	-2.43	8.00	0.04

Table 02 shows the ANOVA table comparing the mean change in the platelet count of white mice exposed to the different treatments. It shows that the calculated F value, 5.67, is greater than the tabular F value,

2.78, which means that there is a significant change in the platelet count of white mice when exposed to the different treatments.

**Table 02:** Summary Table for ANOVA Comparing the Mean Platelet Count of White Mice Classified According to Treatment.

SV	Df	SS	MS	F calc	F tab
Tr	3	266442.3	88814.1	5.673218	2.78
Block	8	960628.6	120078.6	7.670313	
Error	24	375719.4	15654.98		
Total	35	1602790			

## DISCUSSION

The statistical and descriptive data showed that *C. papaya* possesses chromogenic properties, which resulted in a significant increase in platelet count of white mice treated with the extracts of three different varieties of *C. papaya* compared to that of the untreated white mice. [16] Various parts of *Carica papaya* have been traditionally used as ethno-medicine for a number of disorders, including cancer. There have been anecdotes of patients with advanced cancers achieving remission following consumption of tea extract made from *C. papaya* leaves. However, the precise cellular mechanism of action of *C. papaya* tea extracts remains unclear, Otsuki [17]. Based on the case study of Ahmad, 25 ml of aqueous extract of *C. papaya* leaves was administered to patients infected with Dengue fever twice daily, i.e. morning and evening, for five consecutive days [18]. Before the extract administration, the blood samples from the patient were analyzed. Platelet count (PLT), White Blood Cells (WBC) and Neutrophils (NEUT) decreased from  $176 \times 10^3 / \mu\text{L}$ , 84.0% to  $55 \times 10^3 / \mu\text{L}$ ,  $3.7 \times 10^3 / \mu\text{L}$  and 46.0%. Subsequently, the blood samples were rechecked after the administration of leaf extract [19]. It was observed that the PLT count increased from  $55 \times 10^3 / \mu\text{L}$  to  $168 \times 10^3 / \mu\text{L}$ , WBC from  $3.7 \times 10^3 / \mu\text{L}$  to  $7.7 \times 10^3 / \mu\text{L}$  and NEUT from 46.0% to 78.3%. The patient's feelings and blood reports showed that *C. papaya* leaves aqueous extract exhibited potential activity against Dengue fever [20]. The High vitamin C content is one of the papaya nutrient details that we know. One piece of fruit contains a full day's supply of vitamin C [21]. The health benefits of vitamin C are long and varied [22]. As stated by Clement, Vitamin C has been shown to increase platelet count effectively. Vitamin C can be obtained through eating fruits and vegetables or from vitamin supplementation [23]. Vitamin C is water-soluble, which means that the body absorbs it with ease and cannot be overdosed [24]. The body does not make vitamin C, and it must be consumed daily to have lasting effects on platelet count [25]. Papaya leaf is known to contain very high amounts of vitamins A, C, E, K, and B complex, Sega mat [26]. Fur thermo, as stated by Clement, Vitamin C balances platelets to healthy levels, thinning the blood to prevent undesirable clots as well as promoting healthy clotting in those who have had low platelet counts. Vitamin C also increases iron absorption, which is additionally beneficial to healthy platelet levels [27]. According to Swank, the increase in the blood count by the papaya plant is well established in several regions, including Australia, South America, the Philippines and Africa, and has shown proven results of drastic boosts in platelet count [28]. The principal parts used for therapy are leaves and stems. Green leaves

and stems are washed with water and crushed to obtain the extract, which is then taken fresh for a couple of weeks until the platelet count normalizes [29]. Effects on Platelet count are seen anywhere from 2 to 6 weeks of use [30].

#### 4. CONCLUSIONS

Statistical analysis showed that there is significant difference on the platelet count of white mice before and after the introduction of different varieties of *C. papaya* leaf extract. Therefore the null hypothesis is rejected. The statistical data shows that there is significant difference on the platelet count of white mice between the baselines of Treatment B and C and the platelet count of each treatment after three days of exposure on *C. papaya* leaf extract. While the platelet count baseline of Treatment A is not significantly different to the platelet count after three days of exposure on *C. papaya* extract. Statistical analysis showed that there is significant difference on the platelet count of white mice under Variety B and Variety C. While there is no significant difference on the platelet count of treated white mice under Variety A and the Controlled group. Statistical analysis showed that there is significant difference on the platelet count of white mice exposed to the different treatments. Specifically those exposed to the Control, their platelet count is significantly different to those exposed to Variety A, B and C. Also those exposed to Variety A their platelet count is significantly different to those exposed to Variety B. Those white mice exposed to Variety C their platelet count is not significantly different to those exposed to Variety B. Also those exposed to Variety A, their platelet count is not significantly different to those exposed to Variety

#### 5. RECOMMENDATIONS

Testing for the levels of toxicity of *C. papaya* extracts to the different organs of the white mice is recommended. Testing other methods of extraction for *C. papaya* is recommended. Analysis of phytochemicals present in *C. papaya* to determine which increases platelet count and which causes toxicity is likewise recommended. It is proposed to test the clotting time to determine the ratio of clotting time when platelets are increased. Flesh color depends on the strain. Canarius stated that Red Lady papaya is a supreme papaya with bright orange sweet fruits, 1-3 kg each, mostly seedless. Red Lady papaya trees produce fruit on average nine months from seed. It is a hermaphrodite cultivar of average height, tolerant to papaya ring spot virus. As stated by pinoyfarmer Waimanalo is high quality variety with orange yellow flesh, each fruit weighing from one-half to one kilo. This study aimed to determine the effects of fresh young papaya leaf extracts from different varieties on the platelet count of white mice. In this study, *C. papaya*, or much commonly known as papaya plant, was extracted through mechanical or pounding method and was force fed to white mice once every 24 hours for three to six consecutive days. After each treatment, blood specimens were taken and platelet count was analyzed.

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