

Enhancing Platelet counts in patient of Dengue fever by administering extract of leaves of Carica Papaya

Atta Ur Rehman

Margalla College of Pharmacy, Margalla Institute of Health Sciences, Pakistan

*Author E-mail: attaurrehman1987@yahoo.com

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Abstract

The study was conducted with the objective to determine the effect of extract of leaves of carica papaya on platelet count of patients of dengue fever. Two patients were selected at random, who volunteered to take the extract of carica papaya. A 20ml aqueous extract of leaves of carica papaya was administered to each patient in the morning and evening for one week. The observation prior to intake of extract indicate that platelet count, white blood cell, red blood cell and neutrophils decreased on attack of dengue fever and minimum were on third day of attack. After intake of extract of leaves of carica papaya for one week, the platelet count, white blood cells, red blood cells and neutrophils in both patients increased substantially, more so in young patient compared to old patient. The study led to the conclusion that extract of carica papaya was effective in dengue fever and effect was function of age of patient.

Keywords: dengue fever, platelet count, extract of carica papaya

INTRODUCTION

In past malaria caused by anopheles mosquito was regarded as fatal disease, however, in last decade, dengue fever caused by virus induced by Aedes mosquito had turned out to be more fatal than malaria. In 2011 malaria decreased by 21% , while dengue fever disease increased to 215% compared to year 2010 (the daily Jang, April 25, 2012; Pakistan). The dengue disease is mostly prevalent in tropical and subtropical regions of the world. Dengue fever was first recorded in Philippine and Thailand in 1950. At present 2.5 million peoples in 112 countries of world are at risk of dengue fever. Brazil is at top of list in respect of dengue fever, where about one million peoples were affected by dengue fever. Pakistan in 2010 was at position seventeen (17) among Dengue affected countries where as in 2011, it was third most dengue fever affected country in the world.

In Pakistan Dengue fever first occurred in Karachi in 1994 and then in Hub, Baluchistan and Haripur, Khyber pakhtoonkha in 1995. The tyres imported from Thailand carried the eggs of Dengue mosquito. In 2005-06 dengue fever widely spread throughout Pakistan. During 2011, twenty two thousand (22,000) peoples were affected by dengue fever and three hundred and sixty (360) people died because of this disease. In 2011 although whole country was affected, however in Punjab province dengue fever played a havoc most severely affected was Lahore city, where emergency was launched and special dengue wards in hospitals were set up for dengue patients. Dengue emergency response committees were set up to tackle the dengue problem.

Aedes mosquito carries the virus responsible for Dengue fever. The dengue mosquito propagates in water and dengue female lays eggs in clean standing water. Dengue mosquito bites the healthy person in predawn morning hours or prior to sunset. The symptoms of dengue disease are fever, headache, joint and muscle pain, eye pain, red spot in body, vomiting, dysentery and in acute attack bleeding from mouth and body. The platelets, thrombocytes vital components of blood, are reversely affected by dengue fever. During blood cell formulation in bone marrow, the platelets are produced and range of platelet is (15-40) 10 per liter blood and life span is 5-9 days. The function of platelet is maintenance of hemostatis. The number of platelets in blood is dynamic. If number of platelets is low, thrombopenia,

bleeding may occur. Conversely if the number of platelet is high, thrombosis, blood clotting may occur. If the platelet count is decreased to twenty five thousand (25,000), the patient is in critical condition and when platelet count is reduced to ten thousand (10,000) then the platelets are to be injected in patient body. The supply of platelet to patient is costly phenomena specifically for poor patients and moreover, the platelet injection facility is not available in many hospitals in Pakistan.

As platelet supply to dengue patient is costly enterprise, hence alternatives are to be sought. Apple juice with few drops of lemon and extract of leaves of carica papaya had been tested by some physicians and known to increase number of platelets in dengue patient, but this is in experimental stage. Carica papaya a tropical fruit is used as food, cooking aid and in medicines. The papaya skin, pulp and seeds contains carbohydrates, fats, proteins and mineral like calcium, magnesium, iron, phosphorus, potassium, and sodium. A 100 gm of papaya fruit supply energy equivalent to 1630 kJ. Papaya is also rich in carotenoids vitamin B and C, dietary fibers and dietary mineral. Its medicinal value is remedy of digestive problems, cuts, burn, haemophilia, cancer, malaria and even in Dengue fever is advocated. The role of carica papaya in Dengue fever treatment call for experimentation and further documentation in this regard is need of the time.

REVIEW OF LITERATURE

The prevention is better than cure. The research scientist had identified a number of plants that had larvicidal characteristics and had ameliorating effect on malaria and other diseases. Tonk et al. (2006) obtained extract from leaves of *azadirachta indica* and *Artemisia annua* that exhibit larvicidal activity against *Aedes aegypti*, a vector of Dengue fever. Huet et al. (2006) observed that carica papaya contains chymopapain and papain that are effective against digestive disorders. Doinguez et al. (2006) inferred that carica papaya contain lipase a hydrolytic enzymes, that act as natural biocatalyst and was involved in number of biochemical functions, Wiesman et al. (2006) observed that extract of *balanites aegyptiac* contain sponin that had larvicidal properties and was effective in remedy of infectious disease.

Pandy et al. (2007) observed that *spilanthes* plant had larvicidal activity against *Anopheles* and thus its use is effective in control of malaria disease. Okeniyi et al. (2007) investigated that carica papaya seeds were effective against parasites of intestine. The folk medicine practitioners narrated that papaya latex may be used to cure dyspepsia and also applied to scalds and cure of external burns.

Krishna et al. (2008) reviewed the medicinal nutritional and pharmacological characteristics of papaya. The latex, unripe/ripe fruits, leaves, flower, seeds and stem bark of carica papaya had antimicrobial, ant malarial, antifungal and immune modulator characteristics. The potential of carica papaya extract against Dengue fever was also described. Morens et al. (2008) WHO quotes, "Mosquito thrives, so does the Dengue fever". Akram et al. (2010) postulated that Dengue fever mosquito is of wide spread in semi urban and urban areas of tropical and subtropical tract. They further visualized that citrus seed extract may be potentially employed against Dengue fever mosquito specifically *Aedes Albopictus* specie. Ahmad et al. (2011) conducted a study with the objective to ascertain the potential of carica papaya leaves extract against Dengue fever.

The 25ml aqueous extract was administered to patient, in the morning and evening for five consecutive days. The patient health and blood reports indicated improvement in Dengue fever patient. This was case study and to make vibrant recommendation, more investigations are needed. Hence following study was planned in this regard.

OBJECTIVES

The objective of the study were

- To investigate the effect of extract of carica papaya leaves on Dengue fever patients.
- To study the effect of extract of carica papaya leaves on number of blood platelet counts of Dengue fever patients.
- To determine the effect of age of patient in Dengue fever treatment by extract of carica papaya leaves.
- To ascertain the medicinal value of extract of carica papaya leaves in respect of Dengue fever and formulate recommendation in this regard.

Hypothesis

The hypothesis tested were

H₀. The extract of carica papaya leaves had no effect on Dengue fever patient.

H₁. The extract of carica papaya leaves had definite effect on Dengue fever patient.

MATERIALS AND METHODS

The study was conducted in September 2013 as Dengue mostly flourishes after summer rains. The study site was Dengue ward of government district headquarter hospital, Rawalpindi. Two patients were randomly selected from group of Dengue fever patients brought to the hospital. One patient was 35 year old, under metric and worked as mechanic in automobile workshop, while the second patient was 56 year of age with primary education and worked as gardener in private nursery. Hereafter these patients will be referred as patient one (1) and patient two (2) respectively. The symptoms of Dengue fever in patient were severe with red skin, fever of 103°F^0 , shivering, severe vomiting, breathing problem, high blood pressure and severe headache, joint and muscular pain and subsequently bleeding occur. In patient two (2) the Dengue fever symptoms were moderate, fever of 101°F^0 , vomiting, headache, body pain and blood pressure. This is visualized that platelet count is decreased to considerable extent in Dengue fever patient. The blood samples of both patients were taken for three consecutive days. The result of serological study (Table 1) indicated a decrease in platelet counts as the time of illness advanced. The patients were treated with ant malarial drugs and antibiotic thrice for three days, but the health of patient depicted no sign of improvement. Then the patients were informed about extract of carica papaya leaves and they volunteered to the extract.

The fresh plants of carica papaya were collected from garden of research institute in Islamabad. The plant material was washed thoroughly with water. The leaves were grinded in fruit juicer with water. The taste of carica papaya extract was bitter; hence sucrose was added to make it palatable. A 20ml extract was given to each patient to drink in the morning and evening for one week. The blood samples were taken on 1, 3, 5, and 7 days. The blood was analyzed for platelets counts (PLT), white blood cell (WBC), Red blood cell (RBC) and neutrophils. The data collected was subjected to computation and inferences were drawn accordingly.

Table 1. Blood Report of patient prior to administration of extract of Carica Papaya Leaves

Patient	Parameter	1 st day	2 nd day	3 rd day
1	Platelet count	$170 \times 10^3/\text{ul}$	$115 \times 10^3/\text{ul}$	$100 \times 10^3/\text{ul}$
	White blood cell	$7.60 \times 10^3/\text{ul}$	$6.23 \times 10^3/\text{ul}$	$4.01 \times 10^3/\text{ul}$
	Red blood cell	$5.06 \times 10^6/\text{ul}$	$4.92 \times 10^6/\text{ul}$	$4.87 \times 10^6/\text{ul}$
	neutrophils	$6.23 \times 10^3/\text{ul}$	$4.81 \times 10^3/\text{ul}$	$3.00 \times 10^3/\text{ul}$
2	Platelet count	$175 \times 10^3/\text{ul}$	$126 \times 10^3/\text{ul}$	$117 \times 10^3/\text{ul}$
	White blood cell	$8.02 \times 10^3/\text{ul}$	$6.81 \times 10^3/\text{ul}$	$6.14 \times 10^3/\text{ul}$
	Red blood cell	$5.46 \times 10^6/\text{ul}$	$5.17 \times 10^6/\text{ul}$	$4.85 \times 10^6/\text{ul}$
	neutrophils	$7.14 \times 10^3/\text{ul}$	$5.92 \times 10^3/\text{ul}$	$5.27 \times 10^3/\text{ul}$

Table 2. Blood report of patients after administration of extract of Carica Papaya Leaves

patient	Parameter	1 st day	3 rd day	5 th day	7 th day
1	Platelet count	$110 \times 10^3/\text{ul}$	$122 \times 10^3/\text{ul}$	$157 \times 10^3/\text{ul}$	$172 \times 10^3/\text{ul}$
	White blood cell	$4.51 \times 10^3/\text{ul}$	$5.74 \times 10^3/\text{ul}$	$6.25 \times 10^3/\text{ul}$	$7.83 \times 10^3/\text{ul}$
	Red blood cell	$5.02 \times 10^6/\text{ul}$	$5.27 \times 10^6/\text{ul}$	$5.32 \times 10^6/\text{ul}$	$5.37 \times 10^6/\text{ul}$
	neutrophils	$4.31 \times 10^3/\text{ul}$	$5.53 \times 10^3/\text{ul}$	$6.27 \times 10^3/\text{ul}$	$6.35 \times 10^3/\text{ul}$
2	Platelet count	$124 \times 10^3/\text{ul}$	$135 \times 10^3/\text{ul}$	$148 \times 10^3/\text{ul}$	$161 \times 10^3/\text{ul}$
	White blood cell	$6.25 \times 10^3/\text{ul}$	$7.26 \times 10^3/\text{ul}$	$7.73 \times 10^3/\text{ul}$	$8.14 \times 10^3/\text{ul}$
	Red blood cell	$5.07 \times 10^6/\text{ul}$	$5.34 \times 10^6/\text{ul}$	$5.38 \times 10^6/\text{ul}$	$5.38 \times 10^6/\text{ul}$
	neutrophils	$5.52 \times 10^3/\text{ul}$	$5.91 \times 10^3/\text{ul}$	$6.13 \times 10^3/\text{ul}$	$6.22 \times 10^3/\text{ul}$

RESULTS AND DISCUSSION

The data pertaining to blood report of patients prior to administration of extract of carica papaya leaves is presented in table 1. The platelet count in patient 1 on first day was $170 \times 10^3/\text{ul}$ and it decreased during next two days and was $100 \times 10^3/\text{ul}$ on third day. White blood cells (WBC) in case of patient 1 were $7.61 \times 10^3/\text{ul}$ on first day and decreased to $6.23 \times 10^3/\text{ul}$ and $4.06 \times 10^3/\text{ul}$ on 2nd and 3rd day, respectively. Red blood cells on first day were $5.06 \times 10^6/\text{ul}$ and decreased during next two days. Neutrophils, an important component of blood were also affected by dengue fever. The neutrophil on first day were $6.23 \times 10^3/\text{ul}$ and decreased to more than half on third days. Likewise platelet count, white blood cells, red blood cell and neutrophils in patient two (2) on first day were $175 \times 10^3/\text{ul}$, $8.02 \times 10^3/\text{ul}$, $5.46 \times 10^6/\text{ul}$, $7.14 \times 10^3/\text{ul}$. Subsequently these blood parameters decreased on 2nd day and finally on third day of Dengue fever $117 \times 10^3/\text{ul}$, $6.14 \times 10^3/\text{ul}$, $4.85 \times 10^6/\text{ul}$ and $5.27 \times 10^3/\text{ul}$. The data in table 1 revealed that decrease in blood parameter during first 24 hours was more pronounced compared to next 24 hours. The data in the table also indicate that in patient one (1), blood parameters by Dengue fever were more affected and compared to that in patient two (2). The patient 1 was more severely affected by dengue fever in comparison to patient two (2). These differences may be attributed to

variation in immunity level of two patients. The observations outlined above are also in line to Ahmad et al. (2011), they observed that platelets and white blood cells of Dengue fever patient decreased for five consecutive days.

The data pertaining to blood report of patient after administration of extract of carica papaya leaves is presented in table 2. The data in table revealed that platelet count in patient one (1) after administration of extract on first day was $110 \times 10^3/\text{ul}$, that was $10 \times 10^3/\text{ul}$ more compared to prior to extract intake by patient on 3rd, 5th and 7th day that platelet count increased by 10.9, 42.9, and 56.4% respectively. That elucidates exponential increase in platelet count after intake of extract of carica papaya leaves. In patient one (1), the white blood cells increased 73.6 % in a week time compared to first day of intake of carica papaya leave extract. The increase in white blood cell was even more than increase in platelet count in a week by intake of extract. Contrary to this increase of red blood cell was only 6.1%, depicting that red blood cells were little affected by intake of extract of carica papaya. However, neutrophil substantially increased by intake of extract and increase on 7th day was 47.3% compared to day first. This increase was less than platelet count and white blood cells. This increase was less than platelets count and white blood cells. This evidently indicates that various blood parameters were affected differentially. The order of effect was white blood cell, platelet count and neutrophils and least affected were red blood cells.

In case of patient two (2), the platelet count also increased by administration of extract of carica papaya leaves. The platelet count on first day was $124 \times 10^3/\text{ul}$ and increased on 3rd and 5th and 7th day. The platelet on 7th day was 29.8% higher than first day. White blood cell in this patient increased synonymous to that of the platelet count. The red blood cells on first day were $5.07 \times 10^6/\text{ul}$ and increased subsequently on 3rd, 5th and 7th day. On 7th day the increase was 6.01% compared to first day. The neutrophils also improved by intake of extract and were $5.52 \times 10^3/\text{ul}$ on first day and increased to $6.22 \times 10^3/\text{ul}$ on 7th day. This illustrate that all blood parameters in patient 2 increased by intake of extract of carica papaya leaves.

The data in table 2 indicate that the increase in platelet count, white blood cell, red blood cell and neutrophil in patient 1 was 56.4, 73.6, 6.1, and 47.3%, while in patient two(2) the increase was 29.8, 29.9, 6.01, and 12.7%, respectively on 7th day compared to 1st day by administering the extract of carica papaya leaves. This evidently indicates that the increase of blood parameters in patient one (1) was more pronounced compared to patient two (2). The result of present study are in line at Ahmad et al. (2011), they inferred that extract of carica papaya leaves exhibited potential activity against Dengue fever.

The study led to the conclusion that patient of Dengue fever improved in term of platelet count and other blood parameter by intake of aqueous extract of carica papaya leaves. The improvement of patient was also function of age of patient, the younger the patient, more improvement and vice versa. This was a pilot study and it is suggested that more investigations are needed in this regard, so that spread of Dengue fever is curtailed in the country to significant extent.

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