EFFECT OF CARICACEAE CARICA PAPAYA LEAVES IN ELEVATION OF PLATELET COUNT IN DENGUE

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Abstract: Carica papaya is one of the most popular and economically important plants in the world as its fruit is a common grace. The papaya, papaw, or pawpaw is a tall herbaceous plant Carica papaya, with 22 species in the genus.Caricabelongs toCaricaceaefamily. The native of papaw is tropical region of America, mainly from southern Mexico to Central America. Juice of Papaya leaves was believed to oppose dengue. Its leaves are familiar for its anti-malarial properties by increasing the platelet count and are the best home remedy to fight against dengue fever and other illnesses. The therapeutic effect of aqueous extract of papaya (Carica papaya) leaves is assumed to contain several bioactive components such as papain, chymopapain, cystatin, L-tocopherol, ascorbic acid, flavonoids, cyanogenic glucosides and glucosinolates. These exhibit antioxidant property, anti-tumor activity and immune modulator effect which help in reducing lipid peroxidation. Many tropical and subtropical countries are submerged by dengue infection, caused by viruses belonging to Flaviviridae family. In despair, many people have resorted to use papaya leaf extract for effective in fighting against dengue fever. Specialists from the Indian Institute of Forest Management have recently conducted a study and reported to have a significant improvement in overall health and also reduce side effects for increased comfort. Besides,itpossesses some extraordinary anti-cancer property. With the recent dengue outbreak, the use of papaya leaves serves as a natural cure for dengue which received much interest among the population. There is no specific therapy for dengue even though the infection has a significant mortality. Due to its easy availability and affordability, the papaya leaves can be widely used as a natural medicine for curing Dengue.

Keywords: Carica papaya, Antioxidant property, Anti-tumor activity, Immune modulator effect, Dengue.

I. INTRODUCTION

Carica papaya is one of the most popular and economically important plants in the world due to the grace on papaya fruit **(Ong, H., et l., 2011).** Carica papaya is considered as one of the healthiest fruits, which helps in curing many diseases. Not only the pulp but its leaves contain many healing properties. Juice of papaya leaves is likely to cure dengue. It is familiar forincreasing the platelet count with its anti-malarial properties. It is widely used as the best home remedy to fight against dengue fever and other illnesses **(Jiao, Z., et al., 2010).**

With the recent dengue outbreak, the use of papaya leaf as natural remedy for dengue, has received much importance among the population. The therapeutic effects of aqueous extract of carica papaya leaves are assumed to contain several bioactive components such as papain, chymopapain, cystatin, L-tocopherol, ascorbic acid, flavonoids, cyanogenic glycosides and glucosinolates. These are antioxidants that reduce lipid peroxidation, also exhibit anti-tumor activity and immune modulator effects **(Indian pediatrics, 2014).**

Dengue, a viral disease transmitted by the bite of the Aedes mosquito, has reached alarming proportions in the past few years. Over 125 countries, it infects nearly 50-270 million people every year, resulting in anincreased mortality **(Ferreira, G.L., et al.,2012).** In fact, dengue appears to overtake malaria in terms of morbidity **(Gubler, D.J., 2012**). Unfortunately, due to lack of surveillance systems in the underdeveloped and developing countries, the problem is unknown. Travelers from non-endemic areas to the dengue-affected areas are also exposed to the possibility of infection **(Hynes, N.A., 2012).** This makes it an international public health concern, affecting individuals from countries even where the disease is not prevalent.

An herbal medicine being investigated to control dengue is the extract of the leaves of papaya plant named Carica papaya. There have been conflicting reports on the effectiveness of this extract in the treatment of dengue. In this article, we present a brief reviewon dengue and the use of papaya leaf extract for the treatment of such condition.

II. Brief overview of Papaya

2.1. Origin

The papaya, papaw, or pawpaw is a tall herbaceous plant Carica papaya, one among 22 species in the genus Caricabelongs to the family Caricaceae **(Ong, H., et l., 2011**). Carica papaya, is a soft wooded single-stemmed perennial tree, 2-10 m in height, with a crown of large palmate leaves appear from the apex of the main stem. It has a soft, hollow, cylindrical trunk ranges from 30 cm in diameter at the base of 5 cm in diameter at the crown. The edible part of the papaw fruits and leaves are also called papaya and papaya leaves. It is native to the tropical region of America, mainly from southern Mexico to Central America. Now these plants are grown in all tropical regions of the world **(Jiao, Z., et al., 2010).**

2.2. Phyto- chemical constituents

Papaya possessesan excellent medicinal property for treatment of different ailments.It is aneasily available and affordable plant. These are antioxidants that reduce lipid peroxidation, exhibit anti-tumor activity and immune modulator effects. It contains several bioactive components such as papain, chymopapain, cystatin, L-tocopherol, ascorbic acid, flavonoids, cyanogenic glycosides and glucosinolates **(Indian pediatrics, 2014).**

The different parts of the Carica papaya plant including leaves, seeds, latex and fruit have medicinal value. The stem, leaf and fruit of papaya contain lactiferous as it holds specialized cells known as lactifers and secrete plenty of latex. The latex from unripe papaya fruit contain enzymes papain and chymopapain; other components include a mixture of cysteine endopeptidases, chitinases and an inhibitor of serine protease. Phytochemical analysis of Carica papaya leaf extract revealed the positive result for many phytochemicals like alkaloids, glycosides, flavanoids, saponins, tannins, phenols and steroids **(Owoyel, et.al. 2008).**

2.3. Benefits of papaya

Different parts of the papaya plants including fruit, dried fruit, leaves, dried leaves, stems, seeds and roots have long been used as ingredients in alternative medicine. For example, the seeds are used for expelling worms, roots and seeds are used as an abortifacient agent. The leaves are used in treatment of fevers, pyrexia, diabetes, gonorrhoea, syphilis, inflammation and as a dressing for septic wounds **(Owoyele, B.V., 2008**). According to a research in 2010,papaya leaves contain many enzymes known for anti-cancer properties, fighting breast, liver, cervix, pancreatic and lung cancer. The anti-inflammatory properties of papaya leaf could also be helpful in reducing inflammation and chemotherapy side effects.

The papaya leaves have the ability to fight other viral infections such as the common cold. These natural ingredients have been found to regenerate white blood cells and platelets. It alsocontains over 50 ingredients that support the immune system, including Vitamins such as A, C and E **(Owoyele, B.V.,2008).**

Toxicological studies of extracts from different parts of Carica papaya plants such as seeds, fruit, roots and leaves have been carried out in several animal studies. Acute and chronic toxicities of unripe fruit of the C. papaya have also been their efficacy have been proven and documented **(Oduola, T., et al., 2006, Sathasivam, K., et al., 2009**). Recent studies showed that Carica papaya leaf extract has potential anti-sickling property.Papaya leaves are also rich in protease and amylase. These enzymes help to break down proteins, carbs and minerals thereby aiding digestion. Its high anti-inflammatory properties have the tendency to reduce the inflammation of stomach and colon. The juice can also heal peptic ulcers by killing bacteria namely Helicobacter Pylori owing to its antimicrobial property **(Udoh, P., et al., 2005).**

Moreover, C. papaya flowers are known to have antibacterial activities. The contraceptive efficacy of the seeds of C. papaya has been demonstrated earlier in rats, mice and rabbits **(Udoh, F.V., et al., 2005).** Oral administration of C. papaya seed extract could induce reversible male infertility. Papaya leaf juice is a rich source of vitamin C and A, which boost skin health and provide a healthier and glittering skin. Papaya leaf juice suppresses the activity of free radicals. The extract of carica papaya leaf is also used to promote hair growth, and used as an ingredient used for anti-dandruff shampoos for its karpain compound. This alkaloid component is effective in removing dirt and oil from the scalp. It can also serve as a natural conditioner.

2.4. Preparation of C. papaya leaf extract

Fresh, middle aged, C. papaya leaves were picked daily for 7 days. Leaves were washed and the stems were removed before use. After weighing, grind the leaves without adding water or other liquids. Then the mixture was filtered to obtain a pure extract of C. papaya leaves. Finally, the volume of the extract was measured and the stored at 4 °C until use. However, the leaves should be fresh. Using of raw and fresh papaya leaves are good and positive than cooked leaves **(Subenthiran, S. et al. 2013).**

2.5. Dosage of C. papaya leaf extract

In the first trial, 0.5 mL (5 g)/mouse/day was used and in second and third trial, 0.2 mL (2 g)/mouse/day were used. The first trial was conducted to determine a suitable daily dose per mouse. In the third trial, test group mice were fed with fresh C. papaya leaf extract for seven consecutive days (0.2 mL (2 g)/mouse/day), the first of these days being regarded as day one of the trial. Similarly, the control group was given water **(Udoh, FV. et. al., 2005).**

III. Overview of Dengue and Effect of Papaya leaves

Dengue is one of the infection caused by viruses belongs to Flaviviridae family. Thisinfection is transmitted by the Aedes-type mosquito, a species not native to Costa Rica. It's a painful flu-type disease that exists in many tropical towns and cities where many people create natural environments such as old tires, coconut husks, blocked gutters, plastic tarps and anything else that can form small pools of water. This mosquito is believed to be active during the day and often bites at the ankles of the victim legs in the shadows. According to World Health Organization, 23,000 cases in 2011 in and 100 million cases every year worldwide are being reported **(Kumar, N. 2010).**

Many cases of dengue are asymptomatic, especially in children and in adults with a first infection. In other cases, it may appear as self-limited, undifferentiated fever or classic dengue fever. An incubation period varies from 3 to 14 days, followed by a febrile illness consisting of sudden-onset fever, headache, myalgia, arthralgia and rash.Deaths due to dengue are usually a consequence of patients developing complications like dengue hemorrhagic fever and dengue shock syndrome.If left untreated, mortality rate will be 10-20%. It occurs due to progression of thrombocytopenia and development of increased vascular permeability and plasma leakage. It progresses to dengue shock syndrome, which is again associated with high mortality **(Ahmad, N. et.al., 2011).**

Treatment for dengue is usually symptomatic. Some cases require platelet transfusions and fluid management. One of the most disturbing aspects of the problem is that there are no effective antiviral agents available to treat dengue complications. Though symptomatic treatment works in most mild cases, some cases progress to complications rapidly and often make it difficult to save the life of the patient **(Hynes, N.A., 2012).**

So far, no Vaccines were not available for immunization in dengue. The use of herbal-based medicine and medicinal plants such as C. papaya were used as analternative treatment in dengue. Papaya leaves contain bioactive components such as papain, chymopapain, ascorbic acid, flavonoids, saponin, etc., are believed to have potential benefits in treatment of dengue.A report by the British Medical Journal described the rapid recovery of platelet counts in two children suffering from dengue. These cases were proved to be positive for dengue by the demonstrating dengue antigen in the serum. The subjects were administered a spoonful of ground papaya leaves paste every 4 hours. A dramatic increase in platelet counts was observed in one case within 12 hours, the count increased to 100,000. In the second case, it increased within 2 days to 250,000. The duration of treatment was not mentioned in the report **(Kumar, N., et al., 2010).**

A study in the journal of Medicinal and Aromatic Plants reported an increase in platelet counts in five patients within 24 hours who had taken papaya leaf extract for dengue. However, no other details have been provided – whether the dengue was confirmed in these patients, what other treatment was given and whether the increase in platelet count is significant **(Kala, C.P., 2012).**

A study conducted in Malaysia had a more systematic approach in evaluating the use of papaya leaf juice in the treatment of dengue. An open-labeled randomized controlled trial was conducted on 290 patients between the ages of 18 and 60 years with platelet counts ≤100,000/μL. Patients in the intervention group were administered fresh juice from 50 g of C. papaya leaves once a day 15 min after breakfast for 3 consecutive days. In addition, they received the standard treatment for dengue. An increase in arachidonate 12-lipoxygenase and the platelet-activating factor receptor gene expression was also observed in the intervention group. These genes are associated with increased platelet production **(Subenthiran, S., et al., 2013).**

IV. CONCLUSION

The carica papaya discussed above plays major role in treating the dengue fever. The bioactive compounds present in papaya leaves are believed to fight against dengue.Dengue is on the rise in the world and better understanding of the management of dengue is important to avoid dengue haemorrhagic fever. Carica papaya leaves seems to be a promising solution to increase the platelet count. Furthermore, studies can be done on tracing the exact component necessary to treat dengue. This review is likely to provide better results on the effect of papaya leaves on treatment of dengue with many supportive research studies.

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