

Available online on 15.03.2019 at <http://jddtonline.info>

Journal of Drug Delivery and Therapeutics

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Case Study

Pomegranate and sweet lime juices along with green coconut water promote rapid restoration of haematological parameters in patient infected with dengue: A case report

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ABSTRACT

We report a case of dengue fever in a 9-years old Indian child. She was given "anti-hyper thermic" drug paracetamol and anti-biotic amoxicillin for 5 days. The patient was detected with dengue infection (NS1 positive) with a 5 days history of high fever and headache. After scrutinizing the haematology data, the medications (paracetamol & amoxicillin) were stopped and only diet which was continued is fruit juices (pomegranate and sweet lime juices along with green coconut water) as nutritional supplement. After 48 hours of continuous administration of nutritional supplements, blood parameters showed immense change. From this case study it can be stated that, infection with dengue and subsequent decline in the platelet and leukocyte count can well be restored with pomegranate, sweet lime and green coconut water.

Keywords: Dengue, Pomegranate, Sweet Lime, Green Coconut Water

Article Info: Received 24 Jan 2019; Review Completed 26 Feb 2019; Accepted 03 March 2019; Available online 15 March 2019



Cite this article as:

Giri B, Sarkar M, Dash SK, Dey S, Pomegranate and sweet lime juices along with green coconut water promote rapid restoration of haematological parameters in patient infected with dengue: A case report, Journal of Drug Delivery and Therapeutics. 2019; 9(2):387-389 <http://dx.doi.org/10.22270/jddt.v9i2.2390>

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Abbreviation: DENV: Dengue virus; PSO: Pomegranate Seed Oil

INTRODUCTION

In recent days, dengue has been a household curse in the rural as well as urban life and found endemic in Southeast Asia with approximate four distinct serotypes (DENV, 1-4 serotypes). In the year 2007 another serotype DENV-5 was found during screening of viral samples taken from a hospital admitted patient in Sarawak, Malaysia. The last serotype is very rare and still not detected in India ¹. Being different serotypes and presence of environmental mutagens dengue fever has a diverse range of clinical presentation starting from asymptomatic infection to severe multi-organ damage and even death ². Failure of early detection brings the infection stage towards most severe levels and the platelets counts become so low that the patient starts peripheral as well as visceral haemorrhage including liver failure, kidney damage and others major organ dysfunction ³.

The structural proteins i.e. core, pre-membrane and envelope are composed of viral particle though the non-structural proteins (NS1, NS2A, NS2B, NS3, NS4A, NS4B and NS5) are concerned in viral RNA replication, virus assembly and modulation of the host cell responses. The replication of flavivirus generally occurs on virus-induced host cell membranes. DENV (Dengue Virus) requires autophagy for

efficient replication, with recent studies showing that DENV infection induces autophagy, and the inhibition of autophagy reduces significantly DENV replication and release of viral particles. These structures may serve as a scaffold for anchoring the viral replication complexes, which consist of viral RNA, viral proteins and host cell factors ⁴.

Presently available documents undoubtedly call for numerous health benefits of *Punicagranatum* L. (pomegranate). Pomegranates can aid in preventing different kinds of disease threats including, oxidative stress, inflammatory activities, hyperglycemia, high cholesterol, and hypertension. *Punicagranatum* L. (pomegranate) is one of long-lived and drought tolerant plants found in high numbers in the Indian subcontinent. However, pomegranate is characterized as a berry but it fit in the botanical family, *Punicaceae*. The only genus is *Punica*, with one prime species named *P. granatum* ⁵⁻⁶. In this report, we will discuss about the blood homeostasis maintaining role or immunomodulatory roles of the fruit's edible part (including seeds). The edible part of the fruit (50%) consists of 40% arils and 10% seeds. Arils consist of 85% water, 10% total sugars, chiefly fructose and glucose & 1.5% pectin, organic acid, like ascorbic acid, citric acid, and malic acid, and bioactive compounds for instance phenolics and flavonoids,

principally anthocyanins⁷. The seed cover of the fruit contains delphinidin-3-glucoside, cyanidin-3-glucoside, delphinidin-3,5-diglucoside, cyanidin-3,5-diglucoside, pelargonidin-3,5-diglucoside, and pelargonidin-3-glucoside with delphinidin-3,5-diglucoside being the main anthocyanin in pomegranate juice⁸. Phytochemicals such as phenolic compounds, flavonoids, tannins and anthocyanins play an important role in scavenging free radicals⁹. The seed contains phytoestrogen, amongst which steroid hormones are observed that are similar to that found in humankind. Apart from this, 18% of the dry weight of the seed is comprised of oils, rich in punicic acid. The PSO (pomegranate seed oil) has been investigated widely to find out its tissue regeneration and anti-cancer properties¹⁰⁻¹¹. The juice contains a rich quantity of polyphenols, including tannins and flavonoids that assist in the pharmacological capacity of the fruit itself. The flavonoids show antioxidant activity that in turn inhibits the inflammatory mechanisms indirectly¹².

Citrus fruits, which are produced round the globe, have been acknowledged as some of the most consumed fruits in terms of energy, nutrients and health supplements. Furthermore, a good number of these fruits have been used as traditional medicinal herbs to cure diseases in several Asian countries. Citrus fruits are good sources of nutrition with a plenty amount of vitamin C. Besides, the fruits are abundant in other macronutrients, including sugars, dietary fibre, potassium, folate, calcium, thiamine, niacin, vitamin B6, phosphorus, magnesium, copper, riboflavin and pantothenic acid¹³. Though not of much nutritional value, due to containing very low amount of daily dietary proteins and fat (1% each), carbohydrates (4%) and even minerals (less than 10% of what is required), green coconut water has now a days been commercialized as an efficient sports drink for the same reasons. Though it has been rarely used as an intravenous rehydrating agent in modern era, from the age of the Second World War it was known to be able to replace blood plasma when there was a scarcity in availability of medical saline¹⁴. In a recent scientific conference, it was found that in Jamaica coconut water is used as folk medicine against diarrhoea¹⁵.

In this report, we tried to understand the influence of these fruits and their extracts in the recovery process from a dengue infected blood homeostasis.

OUR REPORT

Subjects and Materials-

In our case study, the subject is a nine (9) years old girl. Our subject was detected with dengue infection (NS1 positive,

titre value: 65.8 unit, detected on 14th Sep 2016) after 5 days of high fever. She was given "anti-hyper thermic" drug paracetamol (250 mg SOS for 5 days) and anti-biotic amoxicillin 250 mg, two times a day (for 5 days) under medical supervision. Consequently, the liver function test inferred a very high SGPT (ALT) value (126 U/L). It might have resulted from high consumption of anti-biotic and anti-piratic agents, as has been admitted in several earlier scientific reports. The blood examination report explained the disease condition very vividly as the platelet count depleted to only 1.35 lakhs/ml³ and the total WBC count reduced to 3200/mm³.

Since, no vaccination is possible in case of dengue infection and no other treatment is viable, improvement of health is only possible after re-stabilization of normal body homeostasis. Instantly after observing the haematology data, the medications were stopped and only diet which was continued is fruit juices as nutritional supplements. Three types of fruits were chosen for maintaining healthy combating capability – pomegranate, sweet lime and green coconut. Pomegranate and sweet lime juice were given to our subject girl in 30-50 ml aliquots (juices were administered alternatively in 2-3 hours interval) for the first day i.e., 14th Sep 2016 and a similar quantity of green coconut water. From the next day onwards when the feebleness reduced a bit, the patient could take up an increased amount of fruit juices and green coconut water. The said nutritional supplement was continued for 48 hours after the detection of dengue. The data obtained after 48 hours of continuous administration of nutritional supplements, showed immense change in the blood parameters which were examined prior to the administration of nutritional supplements. The leucocyte count of the blood increased to a surprising 6100/mm³, which is just above the minimal range in a normal individual. Analysing the differential count of WBCs, we found that the most drastic change took place in the count/number of lymphocytes and the percentage of neutrophils therefore changed accordingly.

The main symptom of dengue infection is the depleted count of platelets in the whole blood. In this section, the change by the nutritional supplements were found to be enough effective to nullify the disease symptoms. At the day of detection of dengue, the platelet count was reduced to 1.35 lakhs/mm³. Later it increased beyond the minimal level of normalcy (i.e. 1.5-4.5 lakhs/mm³). (Table 1)

Table 1: Restoration haematological parameters on Pomegranate and sweet lime juices & green coconut water administration

Days	Platelets (lakhs/ mm ³)	Total Count	Differential Count (%)					Hb (g/dl)
		Leucocytes (TC) [count/mm ³]	Lymphocyte	Neutrophil	Eosinophil	Monocyte	Basophil	
1st	1.35	3200	8	82	8	2	0	13.5
3rd	1.75	5200	46	48	4	2	0	14.1
7th	3.1	6100	44	47	7	2	0	14

DISCUSSION AND CONCLUSION

Dengue hemorrhagic fever (DHF) arises subsequent to dengue fever and is characterized by hemorrhagic

manifestations and progressive effusions. Although dengue fever is characteristically a self-limiting disease with a mortality rate of <1%, DHF is a severely fatal disease¹⁶.

Roughly, 20%-30% of patients with DHF are affected with shock owing to loss of intravascular volume¹⁷. Nevertheless, the rate of casualty due to dengue shock syndrome can be reduced to <1% from 40%-50% with early detection and appropriate fluid management. The World Health Organization (WHO) recommends attention to advent of detectable clinical symptoms regarding the development of severe dengue¹⁸. In this case, symptoms such as abdominal pain, a rising hematocrit, and thrombocytopenia aided early diagnosis and enabled rapid implementation of fluid replacement therapy.

Though the fruits, in discussion here, have been reported to have numerous health benefits, these have been primarily viewed as folk medicines. Due to having a rich nutritional value and easy availability in the Indian subcontinent, the fruits have been used as health aids as well as folk medicines where proper medical attention is not available. But instances do take place where there is shortage of medical skill development. Dengue is one such infection where proper anticipatory measures are not certain once the infection has happened. As medical measure then, one can only supply the patient with platelets and nothing much really. Still now, no proper vaccine against dengue is ready for use in these cases of infection. The vaccine called **Dengvaxia**, has been launched, though not in India.

We have discussed here regarding one such infection to a minor. After observing the child with high fever for five days continuously, and feeding anti-hyper thermic drugs and antibiotics, and still when the fever was not cured, a blood test was performed to find the dengue infection (NS1 positive) with a very low platelets and leukocytes count in the blood. Then, under medical supervision only, she was subjected to get treated traditionally with so called folk medicines of our choice- pomegranate juice, sweet lime juice and green coconut water. The results were overwhelming only at the third day of the treatment. The efficiency of the fruits juice was clearly evident as it sharply increased the platelet count in the blood along with restabilising the WBC homeostasis. The total leukocyte count as well as the differential count re-affirmed the efficacy of the fruits juice. The inflammatory phase where neutrophil count increased was ended after 2 days administration of pomegranate juice along with sweet lime juice and green coconut water. The platelet count continued to increase with more days with the same diet plan.

Though any sort of conclusion demands a significant array of wet laboratory experiments to be certain, from this case study it may still be concluded here, that infection with dengue and subsequent decrease in the platelet and leukocyte count can well be treated with folk medicines of the likes of pomegranate, sweet lime and green coconut water.

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