A STUDY OF PAPAYA EXTRACT IN THE TREATMENT OF LOW PLATELET COUNT

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ABSTRACT

BACKGROUND

Thrombocytopenia is defined as platelet count less than one and half lakh per mm cube of blood. Thrombocytopenia has been documented in patients with infectious mononucleosis, cytomegalovirus, and varicella zoster infections. Hepatitis C, tuberculosis and human immunodeficiency virus also have been reported in the causes list. Thrombocytopenia is a well-known complication of chronic lymphocytic leukaemia, although it may not be encountered as easily as seen in autoimmune haemolytic anaemias in these patients. It has also been reported in patients with other lymphoproliferative disorders including Hodgkin's disease. Thrombocytopenia in patients with a variety of solid tumours has also been thought to most likely be immune mediated. Thrombocytopenia may accompany Graves' disease and Hashimoto's thyroiditis, but it is not certain that it is immunologically mediated or not. In our country, Dengue and malaria remain the predominant cause for Thrombocytopenia. Chymopapain and papain are the two important compound that are present in papaya. Lipase, a hydrolase, which is tightly bonded to the water-insoluble fraction of crude papain is also seen in papaya. The papaya seeds and fruits have excellent antibiotic properties. The consumption of unripe and semi-ripe papaya fruits could be dangerous during pregnancy as it contains papain which may cause natural uterine contraction and may lead to abortions. It is reported that the plant extracts of papaya have maximum activity against dengue virus. It also has been reported that the methyl gallate of plant origin interacts with herpes simplex virus and causes its destruction. Majority of the papaya plant parts is known to have antimicrobial property. This study puts in a sincere effort to check the effects of papaya extract in the treatment of low platelet count. This study is intended to help the practising physicians to understand the benefits of the use of papaya extract when using in the cases of thrombocytopenia.

METHODS

Sixty patients who had thrombocytopenia were considered for the study. The study was conducted in the Department of Internal Medicine, Osmania Medical College, Hyderabad, Telangana.

The study was conducted from July 2014 to June 2015.

Detailed history was taken. After taking aseptic precautions, the blood sample was collected and sent for the central lab for platelet count. The initial count was noted as first reading. Then, the patients were given 25 mL of C. Papaya extract three times a day in the morning, afternoon and in the evening. Subsequently, the test was repeated on day two, day three, day four and day five of the treatment. The readings were noted. The final reading on the day five was taken and measured for significance.

RESULT

In the present study, the mean age of the population was 26.06 years with a standard deviation of 3.12 years. Sex related statistics could not be done as the number of female patients was few. Out of the 60 confirmed patients having thrombocytopenia, 8 patients were confirmed to have dengue, 10 patients were found to be having malaria, 32 patients were undergoing chemotherapy, 4 patients were suffering from various thyroid diseases and 6 patients were found to have GIT diseases.

Mean platelet count at the starting of the disease was found to be 50300 in dengue, 82900 in malaria, 49600 in chemotherapy, 85500 in thyroid diseases and 84100 in GIT diseases. After treatment, only chemotherapy patients responded significantly on the first day although on the fifth day it lacked the same pace of prognosis. All other diseases after five days responded very well and crossed the one and half lakh mark.

CONCLUSION

The papaya extract acts as a miracle drug in the treatment of thrombocytopenia. Although exact mechanism of its action is still unknown, if right research is done, it can be guaranteed as a potent drug of choice in the treatment for thrombocytopenia.

KEYWORDS

Papaya Extract, Thrombocytopenia, Dengue, Malaria, Haemorrhage.

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INTRODUCTION: Thrombocytopenia or low platelet count has been well documented in association with a number of medical conditions which include infections, neoplasms and thyroid disease. It is not known whether this increased platelet destruction involves antibody binding, immune complex deposition and antibody mediated complement activation. It may also be a result of an insult or injury to the

stem cells which participate in the production of megakaryocytes which later metamorphose into platelets. Thrombocytopenia has been documented in patients with infectious mononucleosis, cytomegalovirus, varicella zoster infections. Hepatitis C, tuberculosis and human immunodeficiency virus also have been reported in the causes list.

During the last several years, low platelet count was also reported in patients with H. Pylori particularly in Europe and Japan. Platelet counts may or may not normalise with treatment directed only for Helicobacter pylori infections. The ASH guidelines recommend that H. pylori infection be considered in all adults with low platelet count for whom irradiation therapy would be undertaken if testing was positive. Thrombocytopenia is a well-known complication of chronic lymphocytic leukaemia, although it may not be encountered as easily as seen in autoimmune haemolytic anaemias in these patients. It has also been reported in patients with other lymphoproliferative disorders including Hodgkin's disease. Thrombocytopenia in patients with a variety of solid tumours has also been thought to most likely be immune mediated. Thrombocytopenia may accompany Graves' disease and Hashimoto's thyroiditis, but it is not certain that it is immunologically mediated or not. Platelet associated IgG has been increased when studied, but there may also be an element of enhanced reticuloendothelial phagocytosis.

Haemostasis, in simple words, can be defined as the complicated process that underlies the arrest of bleeding. The blood has to be maintained in a fluid state within the vascular system. Bleeding occurs when the blood oozes out of the blood vessels which are damaged. The blood vessels which are injured initiates a series of events in sequence that results finally in the formation of a clot at the site of injury and prevents excessive loss of blood from the body. Thus, haemostasis is a lifesaving process that maintains homeostasis of blood volume. The three important steps or stages in haemostasis are vasoconstriction, temporary haemostatic plug formation and blood coagulation. Platelets come in the picture when temporary haemostatic plug formation is a necessity. This occurs due to three important properties of platelets. Adhesion, aggregation and release reaction are the most important three properties of platelets. The initial response of the platelet to vascular injury is the change in shape of platelets and its increased surface adhesiveness to the injured vascular endothelium. This property signifies the adhesion. Platelets also stick to each other at the site of injury. This property signifies the aggregation. Platelets are also activated to release a number of chemicals that further facilitates vasoconstriction, adhesion and aggregation. The whole process finally results in formation of a platelet plug that arrests bleeding temporarily. As platelet plug is not a stable one, the plug is called temporary haemostatic plug and the process is called temporary haemostasis.

Platelets are smallest formed elements of blood. They are anucleate fragments of megakaryocytes. Megakaryocytes are the giant cells in the bone marrow. Platelets develop from myeloid stem cells that from CFU – Mega in turn develop into megakaryoblasts. Megakaryocytes form platelets by pinching off bits of cytoplasm and extrude the pieces into circulation. On average, each megakaryocyte produces a thousand to three thousand platelets. Normally, platelet production per day is about thirty thousand to forty five thousand per microlitre. Platelets have the half-life of about four days. They survive in circulation for about eight to twelve days. The aged platelets are removed from circulation by reticuloendothelial systems. Spleen plays an important role in the destruction of the platelets. Therefore, platelet count is known to increase after splenectomy and tend to decrease in splenomegaly.

Normal count of platelet is one and half lakh to about four lakhs per mm cube of blood. Thrombocytopenia is defined as the platelet count less than one and half lakh per mm cube of blood. However, significant bleeding occurs when platelet count decreases below fifty thousand per mm cube of blood. Therefore, platelet count below fifty thousand per mm cube of blood is called critical count. Thrombocytopenia occurs in idiopathic thrombocytopenic purpura, aplastic anaemia, hypersplenism, acute leukaemia, cytotoxic chemotherapy and radiation. About seventy percent platelets released from bone marrow are present in circulation and thirty percent destructed in spleen.

In India one of the most common causes of Thrombocytopenia is the Dengue haemorrhagic fever. The disease is caused by Dengue viruses.[1] Dengue is found in tropical and subtropical regions around the world like and the fact that our country lies in the tropics, means that the disease is rampant.[2] According to latest statistics, it is estimated that there are between fifty and one hundred million cases of dengue fever and about 5,00,000 cases of dengue haemorrhagic fever each year which require hospitalisation.[3] Dengue fever is spread through the bite of an infected Aedes aegypti mosquito.[4] With each infection the patient gets lifelong immunity to that particular serotype but subsequent infection with a different serotype is possible.[5] Unfortunately, due to lack of adequate surveillance systems in the underdeveloped and developing countries, the exact extent of the problem is not known.[6]

Chymopapain and papain are the two important compounds that are present in papaya.[7]

Lipase, a hydrolase, which is tightly bonded to the water-insoluble fraction of crude papain is also seen in papaya.[8] The papaya seeds and fruits have excellent antibiotic properties.[9] The consumption of unripe and semi-ripe papaya fruits could be dangerous during pregnancy as it contains papain which may cause natural uterine contraction and may lead to abortions.[10]

It is reported that the plant extracts of papaya have maximum activity against dengue virus.[11] It also has been reported that the methyl gallate of plant origin interacts with herpes simplex virus and causes its destruction.[12] Majority of the papaya plant parts is known to have antimicrobial property.[13]

This study puts in a sincere effort to check the effects of papaya extract in the treatment of low platelet count. This

study is intended to help the practicing physicians to understand the benefits of the use of papaya extract when using in the cases of thrombocytopenia.

AIMS AND OBJECTIVES: To study the effects of papaya extract in the treatment of low platelet count.

METHODS: Sixty patients who had thrombocytopenia were considered for the study. The study was conducted in the Department of Internal Medicine, Osmania Medical College, Hyderabad, Telangana.

The study was conducted from July 2014 To June 2015.

Detailed history was taken. After taking aseptic precautions the blood sample was collected and sent for the central lab for platelet count. The initial count was noted as first reading. Then, the patients were given 25 mL of C. Papaya extract three times a day in the morning, afternoon and in the evening. Subsequently, the test was repeated on day two, day three, day four and day five of the treatment. The readings were noted. The final reading on the day five was taken and measured for significance.

Inclusion Criteria:

1. All patients were taken between the age group of twenty and thirty years.
2. Patients who had confirmed thrombocytopenia were considered for the study.

Exclusion Criteria:

1. All patients who were aged < 20 years and > 30 years were not considered. This was done to reduce the age related bias.
2. The patients who were known to have central bone marrow diseases were not considered for the study.

All the statistics were done using the SPSS software 2015, California.

RESULTS:

	Mean	Std. Deviation
Age	26.06 years	3.12 years

Table 1: Mean Age of the Population under Study

Disease Causing Thrombocytopenia	Thrombocytopenia	Percentage
Dengue	08	13.33%
Malaria	10	16.66%
Chemotherapy	32	53.33%
Thyroid diseases	04	6.66%
GIT diseases	06	10%

Table 2: Different Diseases that were causing Thrombocytopenia

Disease Causing Thrombocytopenia	Mean Platelet Count	Standard Deviation
Dengue	50300	10000
Malaria	82900	11500
Chemotherapy	49600	10200
Thyroid diseases	85500	15300
GIT diseases	84100	14500

Table 3: Mean Platelet count in the Beginning

Disease Causing Thrombocytopenia	Initial Platelet Count	2nd day	3rd day	4th day	5th day
Dengue	50300	73000	98000	1.3 lakhs	1.6 lakhs
Malaria	82900	84000	1.17 lakhs	1.4 lakhs	1.58 lakhs
Chemotherapy	49600	53100	78000	92000	1.1 lakhs
Thyroid diseases	85500	88000	1.1 lakhs	1.42 lakhs	1.7 lakhs
GIT diseases	84100	85200	1.13 lakhs	1.47 lakhs	1.74 lakhs

Table 4: Mean Platelet Count After Treatment

Chemotherapy Initial Response	
Mean Platelet Count	49600
Second day platelet Count	53100
Significance (P < 0.05)	0.041

Table 5: Test for Significance

DISCUSSION: In the present study, the mean age of the population was 26.06 years with a standard deviation of 3.12 years. Sex related statistics could not be done as the number of female patients was few. Out of the 60 confirmed patients having thrombocytopenia, 8 patients were confirmed to have dengue, 10 patients were found to be having malaria, 32 patients were undergoing chemotherapy, 4 patients were suffering from various thyroid diseases and 6 patients were found to have GIT diseases.

Mean platelet count at the starting of the disease was found to be 50300 in dengue, 82900 in malaria, 49600 in chemotherapy, 85500 in thyroid diseases and 84100 in GIT diseases. After treatment, only chemotherapy patients responded significantly on the first day although on the fifth day it lacked the same pace of prognosis. All other diseases after five days responded very well and crossed the one and half lakhs mark.

In the other study conducted by Nisar Ahmad,[14] they reported a rise in platelet count of 73000 on the first day, 120000 on the second day, 137000 on the third day, 159000

on the fourth day and 168000 on the fifth day. The clear-cut disease was not considered for the study, but in our study it was considered. The difference might be due to the fact that the population studied was different and the fact that we in our study prescribed to take the papaya extract three times a day was different from their study. In their study, they prescribed to take the medicine only twice.

The exact mechanism of thrombocytopenia is not known. It might be caused by two mechanisms. Firstly it may be due to suppression of the production of the platelets and secondly due to peripheral destruction of the platelets.

CONCLUSION: The papaya extract acts as a miracle drug in the treatment of thrombocytopenia. Although exact mechanism of its action is still unknown but if right research is done it can be guaranteed as a potent drug of choice in the treatment for thrombocytopenia. This study paves the way for further studies in the near future so that it can be helpful for the treatment especially in a tropical country like ours where dengue and malaria are quite rampant.

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