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

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ABSTRACT

BACKGROUND
Thrombocytopenia is defined as a 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 a sincere effort to check the effects of papaya extract in the treatment of low platelet count. 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.

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.


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,
cytoxic 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:

<table>
<thead>
<tr>
<th>Disease Causing Thrombocytopenia</th>
<th>Thrombocytopenia</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dengue</td>
<td>08</td>
<td>13.33%</td>
</tr>
<tr>
<td>Malaria</td>
<td>10</td>
<td>16.66%</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>32</td>
<td>53.33%</td>
</tr>
<tr>
<td>Thyroid diseases</td>
<td>04</td>
<td>6.66%</td>
</tr>
<tr>
<td>GIT diseases</td>
<td>06</td>
<td>10%</td>
</tr>
</tbody>
</table>

Table 1: Mean Age of the Population under Study

<table>
<thead>
<tr>
<th>Disease Causing Thrombocytopenia</th>
<th>Mean Platelet Count</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dengue</td>
<td>50300</td>
<td>10000</td>
</tr>
<tr>
<td>Malaria</td>
<td>82900</td>
<td>11500</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>49600</td>
<td>10200</td>
</tr>
<tr>
<td>Thyroid diseases</td>
<td>85500</td>
<td>15300</td>
</tr>
<tr>
<td>GIT diseases</td>
<td>84100</td>
<td>14500</td>
</tr>
</tbody>
</table>

Table 2: Different Diseases that were causing Thrombocytopenia

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

Table 4: Mean Platelet Count After Treatment

<table>
<thead>
<tr>
<th>Chemotherapy Initial Response</th>
<th>Mean Platelet Count</th>
<th>Second day platelet Count</th>
<th>Significance (P &lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Platelet Count</td>
<td>49600</td>
<td>53100</td>
<td>0.041</td>
</tr>
</tbody>
</table>

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, 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.

REFERENCES