

Clinical Characteristics and Risk Factors for Dengue Fever at Tertiary care Teaching Hospital

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Abstract

INTRODUCTION

The measure known as immature platelet fraction (I.P.F.) was added to several cell counters lately. Reticulated platelets are quantified by the immature platelet fraction, an indicator of thrombopoiesis. This has a reticulocyte analogue. Many organisations across the world already employ IPF to track instances of Thrombotic Thrombocytopenic Purpura, Immuno Thrombocytopenic Purpura, and Marrow Transplant to precisely forecast thrombocytopenia recovery. The purpose of this study was to assess the relevance of immature platelet fraction as an indication of platelet recovery in instances of dengue fever patients, given the paucity of literature on IPF among dengue fever subjects, particularly in India and our region.

MATERIAL AND METHODS

This was a one-year prospective observational research including one hundred dengue patients who presented to the general medicine department at KIMS, Hubli. The study recruited participants using universal sampling. Once patients gave their written informed permission, all instances that satisfied the inclusion criteria were included. Data was gathered using a structured questionnaire. First data was collected, including residence, income, place of employment, sex, and age. Subsequently, a thorough medical history and examination were conducted, and lab tests such as CBC, platelet count, NS1 Antigen test, IgM/IgG test, and immature platelet fraction were performed. SPSS 22 version software was used for data analysis after the data was input into a Microsoft Excel data sheet. Frequencies and proportions were used to depict categorical data. Mean and standard deviation were used to depict continuous data. The significance test for paired data, like before and after, is the paired t test. following surgery for numerical information. To determine the correlation between two quantitative variables, Pearson correlation analysis was used.

RESULTS

The age range of the majority of individuals was 21 to 30 years old. The subjects were mostly men. The platelet count has significantly increased in less than 72 hours as compared to the admission readings. implying that the platelet count rose following hospitalisation. Within less than 24 hours, the platelet counts of most research participants recovered to normal.

IPF and platelet count upon admission showed a strong negative association, meaning that when participants' platelet counts dropped, IPF increased and vice versa.

CONCLUSION

A prognostic sign for platelet recovery is the immature platelet fraction (IPF). There Is A Negative Correlation Found Between Ipf And The Platelet Count. As A Reliable Source of Information for Decisions About Platelet Transfusions in the Future, It Is Very Important. The platelet count typically recovers in less than 24 hours for the majority of dengue patients. An indicator of platelet recovery's prognosis is the immature platelet fraction (IpF). It's Very Important As A Reliable Platelet Transfusion Marker.

KEYWORDS: Dengue, Predictive Marker, Immature Platelet Fraction

INTRODUCTION

One of the four serotypes of the single-stranded RNA virus of the genus Flavivirus, Dengue virus (DENV), which is carried by arthropods, causes dengue, an acute viral disease spread by mosquitoes. *Aedes* mosquitoes, namely *Aedes aegypti*, are the vectors that spread dengue, with an incubation period of 4–7 days, however it can also be 3–14 days². Dengue transmission peaks during the monsoon and post-monsoon periods. The illness dengue is mainly seen in cities. Dengue fever has become more common in developing countries like India because of poor water management, unplanned urbanisation, and population movement from rural to urban regions without access to adequate sanitary services. Globally, DF and DHF are currently also expanding into rural regions.

Dengue is currently the world's most significant virus spread by mosquitoes. At least 112 nations now have dengue outbreaks, putting 2.5–3 billion people, or 40% of the world's population, at risk in tropical and subtropical regions⁴. Globally, there are 50 million instances of DHF and 100 million cases of DF annually^{2,5-7}. Dengue has become 30 times more common in the last 50 years, and major outbreaks have been reported in five of the six WHO areas. With 52% of the worldwide risk, South East Asia is among the regions with the highest risk of DF/DHF.

The Eastern Coast of India and Calcutta saw the first virologically confirmed DF outbreak in India during 1963 and 1964⁸. These days, reports of outbreaks from all throughout our nation are very common. Dengue fever cases increased in India between 2010 and 2014, from 6.34 cases per million to 34.81 cases between 1998 and 2009. The prevalence of DF has skyrocketed in the recent

forty years. When a dengue infection first appears, it may be asymptomatic (50–90%)¹⁰, cause a generalised fever, or result in a combination of symptoms from typical dengue fever (DF) to dengue shock syndrome (DSS), including multiorgan failure as a component of a severe disease.¹¹ Few individuals who have already had a particular dengue serotype experience haemorrhaging and endothelial leak when a different dengue serotype is acquired. Dengue Hemorrhagic fever (DHF) is the name given to this syndrome¹².

Thrombocytopenia, leucopenia, and increased liver enzyme¹³ are typical test findings of dengue fever. Acalculous cholecystitis, pancreatitis, diarrhoea, myositis, myocarditis, conduction abnormalities, disseminated intravascular coagulation, and atrial fibrillation are among the atypical symptoms of Dengue fever. Other

neurological symptoms that are considered atypical include transverse myelitis, meningitis, encephalitis, seizures, and Guillain-Barré syndrome. In order to reduce disease-related morbidity and death, early detection and timely treatment start are essential. When caught early, dengue fever usually has a less than 1% fatality rate and is a self-limiting illness. Severe Dengue has a 2%–5% fatality rate when treated; but, if ignored, the death rate can reach 20%. Patients with DHF and DSS may have as high of a case fatality rate.

The SYMEX XNL 350 cell counter now includes the recently added metric known as immature platelet fraction (I.P.F.). Using a dye such as oxazine, flow cytometry can reliably quantify the RNA of these platelets. Reticulated platelets are quantified by the immature platelet fraction, an indicator of thrombopoiesis. This is comparable to reticulocytes. Numerous organisations worldwide already employ IPF to track instances of Thrombotic Thrombocytopenic Purpura, Immuno Thrombocytopenic Purpura, and Marrow Transplant to precisely forecast thrombocytopenia recovery¹⁵. The purpose of this study was to assess the relevance of immature platelet fraction as an indication of platelet recovery in instances of dengue fever patients, given the paucity of literature on IPF among dengue fever subjects, particularly in India and our region.

MATERIAL AND METHODS

Inclusion Criteria

1. Dengue fever cases confirmed by NS1Ag test or both NS1Ag and IgM MACELISA.
2. Platelet count less than 1.5 lakhs/ Cumm.

Exclusion Criteria

1. Dengue cases platelet more than 1.5 lakhs / Cumm.
2. IgG Positive Cases.
3. Those who doesn't give consent for study.

Study Design: Prospective Observational Study

Sampling technique: Universal sampling [All cases during the study period were Included]

Sample size: 100 cases of Dengue fever

Method of Data

Once patients gave their written, informed permission, all instances that met the inclusion criteria were included. The information was gathered using a structured questionnaire. First data were collected, including residence, income, place of employment, sex, and age. Lab tests such as CBC, platelet count, NS1 Antigen test, IgM / IgG test, and immature platelet fraction were performed after a thorough history and clinical examination.

STATISTICAL ANALYSIS

SPSS 22 version software was used for data analysis after the data was input into a Microsoft Excel data sheet. Frequencies and proportions were used to depict categorical data. Mean and standard deviation were used to depict continuous data. The test of significance for paired data, such as before and after surgery for quantitative data, is the paired test.

RESULT

Table 1: Age Distribution of Subjects

		Count	%
Age	<20 years	22	22.0%
	21 to 30 years	53	53.0%
	31 to 40 years	11	11.0%
	41 to 50 years	11	11.0%
	>50 years	3	3.0%
	Total	100	100.0%

Mean age of subjects was 28.02 ± 10.009 years. Majority of subjects were in the agegroup 21 to 30 years (53%).

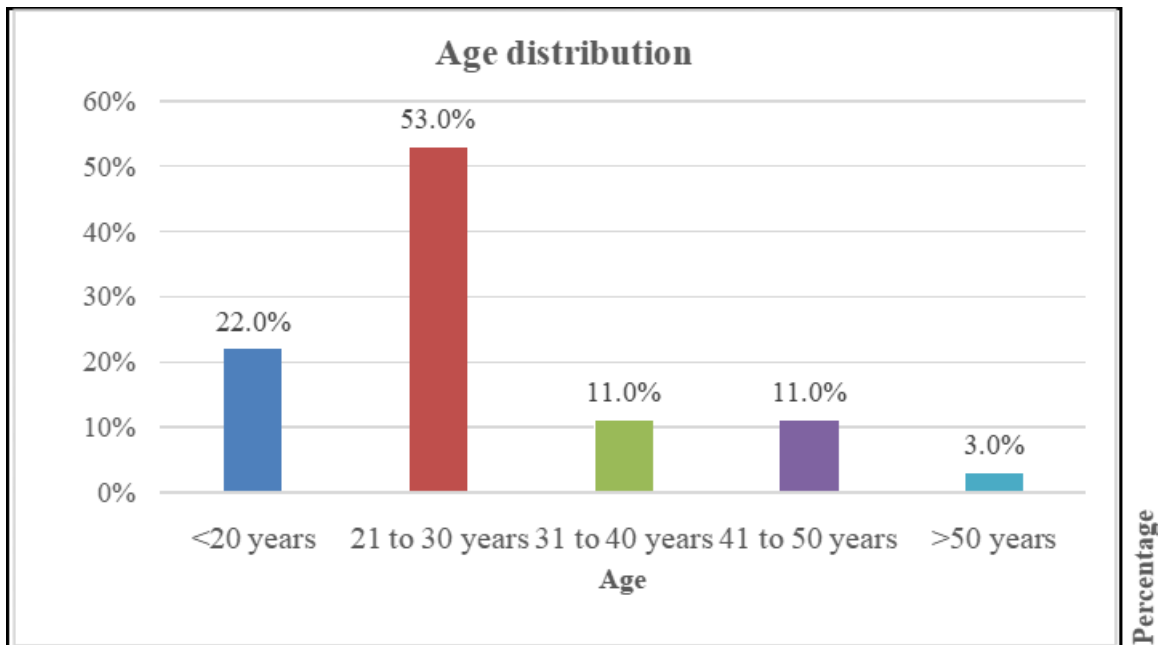


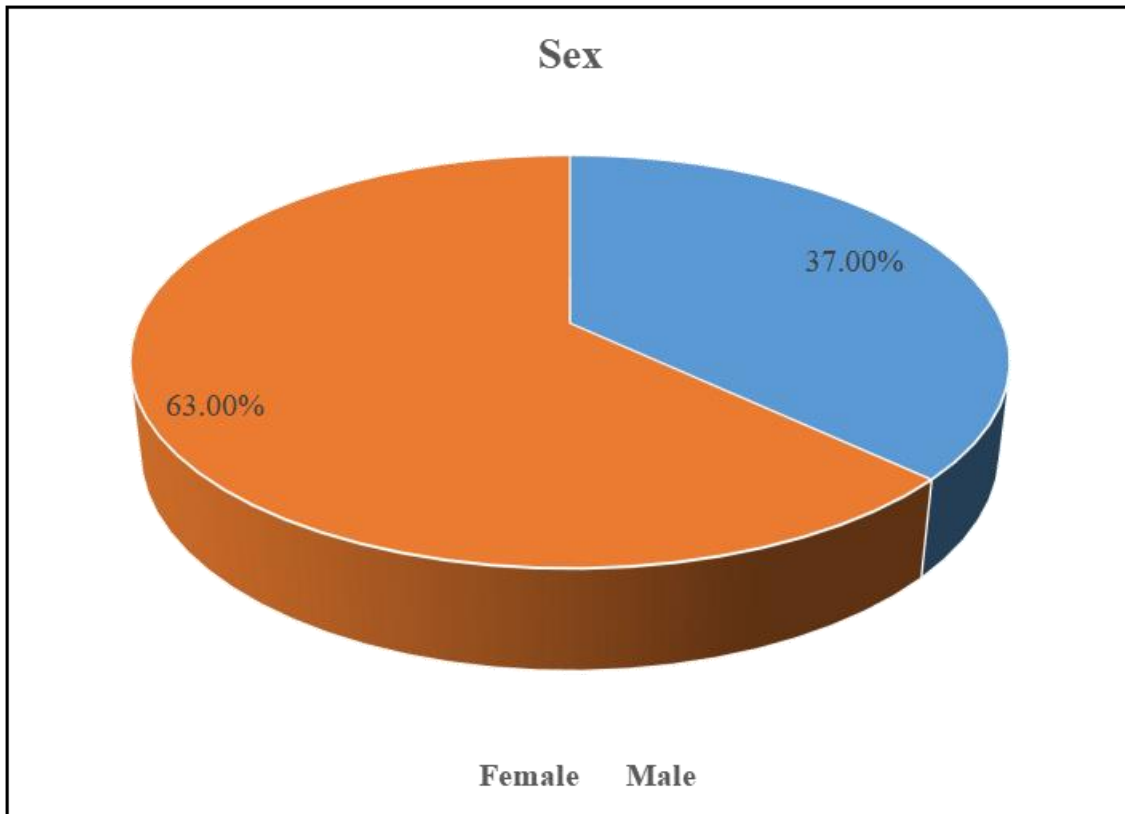
Figure 1: Bar Diagram Showing Age Distribution Of Subjects

Table 2: Sex distribution of subjects

	Count	%

Sex	Female	37	37.0%
	Male	63	63.0%

In the study 63% were males and 37% were females.



■ ■ Figure 2: Pie Diagram Showing Sex Distribution Of Subjects.

Table 3: Clinical features among subjects

	No		Yes	
	Count	%	Count	%
Fever	0	0%	100	100%
Headache/ROP	32	32%	68	68%
Joint Pain	58	58%	42	42%
Bleeding Manifestations	84	84%	16	16%
Myalgia	22	22%	78	78%
Abdominal Pain	59	59%	41	41%
Vomiting	75	75%	25	25%
Oliguria	99	99%	1	1%
Seizures/Alt Sensorium	95	95%	5	5%

In the study 100% had fever, 68% had Headache, 42% had joint pain, 16% had bleeding manifestations, 78% had myalgia, 41% had abdominal pain, 25% had vomiting, 1% had oliguria and 5% had Seizures/Alt Sensorium.

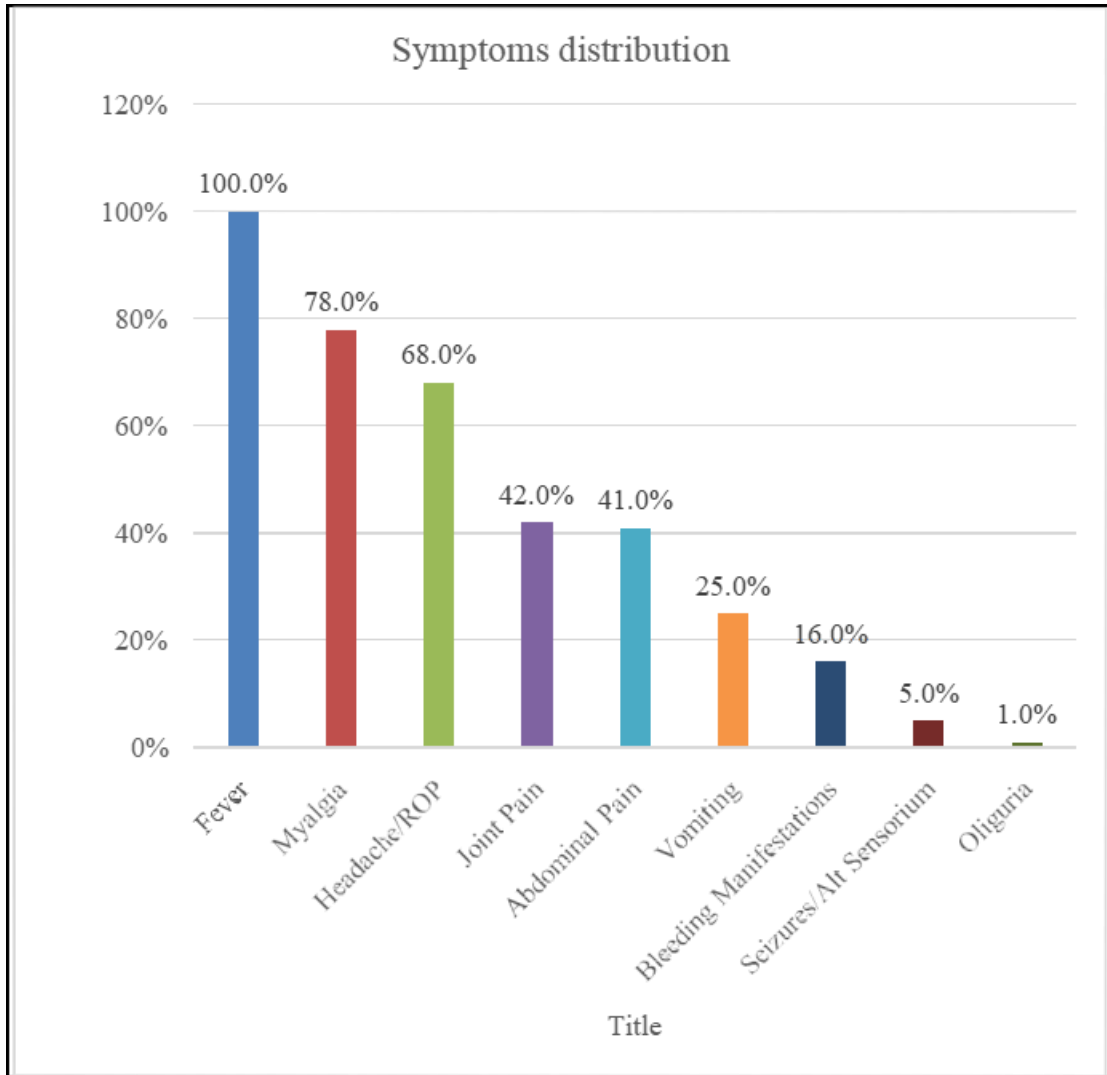


Figure 3: Bar Diagram Showing Symptoms Distribution Among Subjects

Table 4: Signs distribution among subjects

	Yes		No	
	Count	%	Count	%
Pallor	8	8%	92	92%
Icterus	4	4%	96	96%
Rashes / Petechiae	22	22%	78	78%
Edema	3	3%	97	97%
Sinus Bradycardia	6	6%	94	94%
Hypotension	13	13%	87	87%

In the study 8% had pallor, 4% had icterus, 22% had Rashes / Petechiae, 3% had edema, 6% had Sinus Bradycardia and 13% had Hypotension.

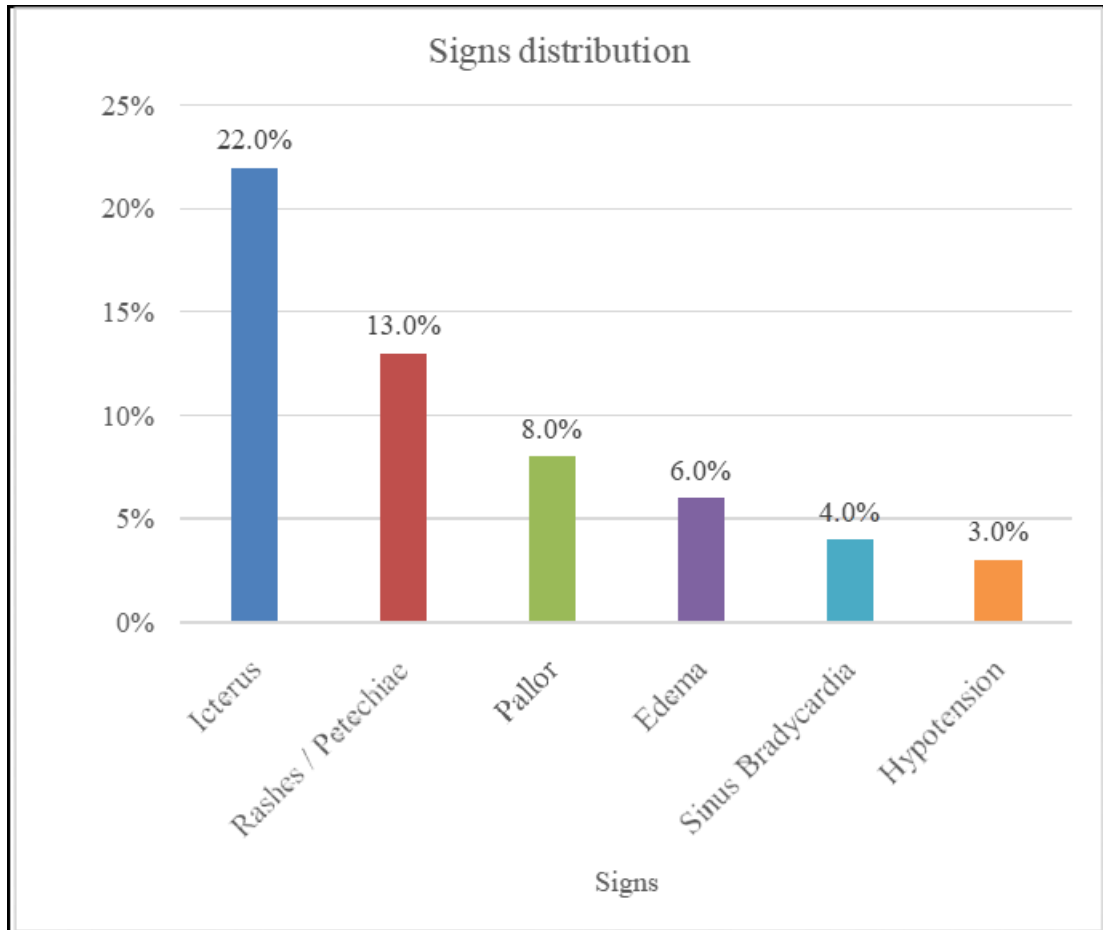


Figure 4: Bar Diagram Showing Symptoms Distribution Among Subjects

Table 5: Platelet Count At Various Intervals

	N	Mean	SD	P value
Platelet Count at Time of Admission	100	73070.00	33138.295	
Platelet Count <24hrs	100	148110.00	41825.007	<0.001*
Platelet Count >24hrs and <48hrs	23	152391.30	26600.990	<0.001*
Platelet Count >48hrs, and <72hrs	5	160200.00	5118.594	<0.001*

In the study mean Platelet Count at Time of Admission was 73070.00 ± 33138.29 , at <24 hrs was 148110.00 ± 41825.007 , at >24hrs and <48hrs was 152391.30 ± 26600.990 and at >48hrs, and <72hrs was 160200.00 ± 5118.594 hrs. There was significant increase in Platelet count at <24hrs, >24hrs and <48hrs and >48hrs, and <72hrs compared to admission values.

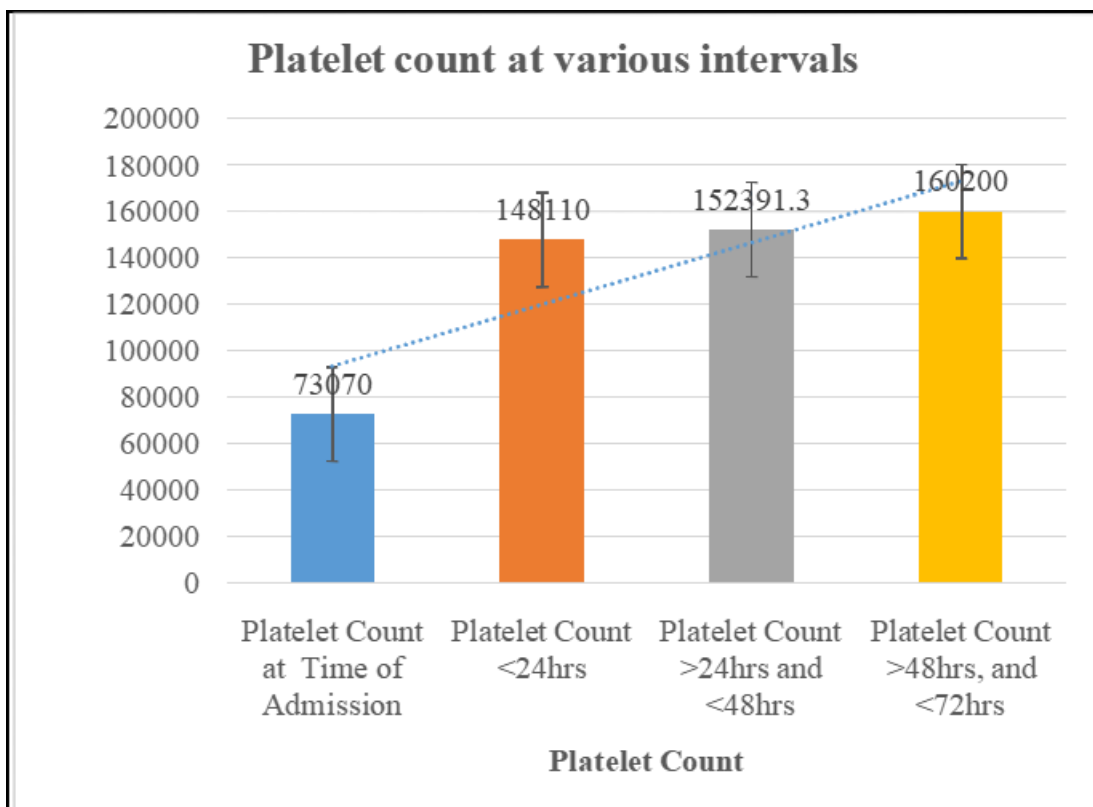


Figure 5: Bar Diagram Showing Platelet Count At Various Intervals

DISCUSSION

One of the main issues with public health is dengue illness. A primary problem associated with dengue illness is thrombocytopenia. Patients and doctors alike anxiously await a rise in the platelet count. It is frequently seen that needless platelet transfusion occurs frequently, exposing the patients to a variety of transfusion-related adverse responses. Numerous research have been conducted, and several of them have produced unique indicators that can be used to predict platelet recovery.

In terms of their Mean Platelet Volume (MPV), Platelet Distribution Width (PDW), Plateletcrit (PCT), and Immature Platelet Fraction (IPF), the platelets' activity and regeneration have been evaluated. Among all the characteristics, IPF has demonstrated encouraging outcomes in conditions such as ITP and following immunosuppressive treatment. IPF measurement is quick, easy, and non-invasive. It gives quick information regarding platelet life span and bone marrow megakaryocyte activity. In order to better understand the IPF function in connection to platelet count in dengue fever patients, this study was carried out. Numerous investigations on the parameter of immature platelet fraction and its

relationship to platelet recovery have been conducted in the Mediterranean and South East Asian regions.

New research has shown that IPF% is useful for purposes other than diagnosing thrombocytopenic individuals. Reducing the amount of needless platelet transfusions by using the IPF% as a helpful metric to evaluate platelet recovery following chemotherapy and peripheral blood stem cell transplantation. Adults who get a peripheral blood stem cell transplant see an increase in IPF% 1-2 days before their platelet count increases. After chemotherapy, Saigo et al. saw platelet recovery in paediatric patients with a variety of malignant illnesses within 3–7 days of the day of peak IPF%.

A positive and substantial association was seen between the IPF value and platelet count 24 hours after the presentation (day 2). The correlation coefficient, or r , was 0.133, and the p -value was less than 0.05, indicating statistical significance. Similarly, the correlation coefficient (r) was 0.303 and the p -value was less than 0.01 after 48 hours (day 3). Were discovered a negative link because, in the current investigation, IPF was connected with platelet count upon admission.

According to Haiyoung Jung et al.'s study (100), the best cut-off value for 93.3% sensitivity in separating ITP patients from healthy controls was an IPF% value of 2.6%. and a 93.9% specificity. 7.3% was the ideal cut-off value with a sensitivity of 54.0% and a specificity of 92.2%. Despite the lack of control groups in our investigation, the 5.1% cutoff point was used to predict the recovery of platelet counts.

An automated method of measuring reticulated platelets in peripheral blood is called Immature Platelet Fraction (IPF). The mean IPF in this research was 5.561 ± 1.09 percent. IPF was $>8\%$ in 2% of cases and $<8\%$ in 98%. IPF and platelet count upon admission showed a strong negative connection ($r = -0.518^*$) in the research, meaning that when participants' platelet counts decreased, IPF increased and vice versa. When it came to predicting platelet recovery after 24 hours, IPF at 5.1 had the highest sensitivity (40.26%), specificity (95.6%), PPV (96.88%), NPV (32.35%), and diagnostic accuracy (53%).

CONCLUSION

A Negative Association Has Been Discovered Between The Platelet Count And Ipf. It Is Extremely Important As A Trustworthy Future Reference For Choices Pertaining To Platelet Transfusions. For Most Dengue Patients, The Platelet Count Tends To Rebound In Less Than 24 Hours. One Prognostic Sign For Platelet Recovery Is The Immature Platelet Fraction (Ipf). It's Very Significant As A Trustworthy Marker For Platelet Transfusions.

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