East African Scholars Journal of Medical Sciences
Abbreviated Key Title: East African Scholars J Med Sci
ISSN: 2617-4421 (Print) & ISSN: 2617-7188 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-5 | Issue-2 | Feb-2022 | DOI: 10.36349/easms.2022.v05i02.001

Original Research Article

To Study of the Correlation between Vitamin B12 Level and Thrombocytopenia in Dengue Fever and Malaria

Yogesh Kumar Kansara[1*], Eshan Sharma[1]

[1,2]Department of General Medicine, National Institute of Medical Science and Research, NIMS University Rajasthan, Jaipur, India

Article History
Received: 30.12.2021
Accepted: 04.02.2022
Published: 15.02.2022

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Introduction:*** Thrombocytopenia is a common symptom of malaria, and typically occurs more frequently in Falciparam malaria. It appears that P. vivax does trigger thrombocytopenia, contrary to popular belief. Therefore, patients with low platelets and fever ought to be considered for malaria, though B12 deficiency does not always accompany malaria cases. Methods**:** This study was conducted at indoor patients at the NIMS hospital to investigate the relationship between vitamin B12 with thrombocytopenia associated with dengue fever and malaria. Patients were investigated for routine investigations such as CBC, ESR, RFT, RBS, LFT, PBF, VIT B12 LEVEL, Dengue profile and MP card test. In out of 125 patients,75 patients have dengue fever, and 50 patients have malaria fever. ***Result:*** In dengue fever out of 75 patients, 61 patients (81%) had thrombocytopenia with vitamin B12 deficiency (B12 level <100 pg/l). In malaria out of 50 patients, 28 patients (56%) have thrombocytopenia with vitamin B12 level (B12 level >300 pg/l), 22 patients (44%) have thrombocytopenia with vitamin B12 level normal (B12 level 201-300). Vitamin B12 level < 190 pg/ml was found in 47(94%) patients with severe thrombocytopenia while 32 number (74%) patients with mild thrombocytopenia. In group with B12<190 pg/ l need of SDP transfusion was significantly high i.e; (115.13±42.08) in comparison to other groups, as well as the recovery time of platelets to 20000/µl threshold, was found to be high in B12 <190 pg/l group (42.60±8.89 days) as compared to other groups. ***Conclusion:*** Using platelet analysis by PBF, the results of this study were obtained. There is no clumping of platelets, and the platelets show the normal size, color, and shape.

Keywords: Falciparam malaria, thrombocytopenia, vitamin B12.

INTRODUCTION

Thrombocytopenia, defined as a platelet count of less than 150*109/L, has numerous causes, can be broadly divided into two types i.e; congenital and acquired. A deficiency in folate or vitamin B12 may also be associated with low levels of platelets in some cases. Vitamin B12 is essential for erythropoiesis and thrombopoiesis. The incidence of thrombocytopenia in symptomatic B12 (cobalamin deficiency) is approximately 10%. B12 levels didn't seem to be related to other dengue complications such as bleeding, septicemia, and shock. Apart from anaemia and leukopenia, severe vitamin B12 deficiency may also cause thrombocytopenia.

The goal of our study is

1. To assess the platelet morphology and counts in patients of dengue fever and malaria.
2. To correlate between vitamin B12 deficiency and severity of thrombocytopenia, platelets recovery and duration of hospital stay in dengue and malaria case.

MATERIALS AND METHODS

We carried out a prospective study over a period of 18 months, from January 2020 to Jun 2021; All the cases of dengue and malaria will be selected on the basis of selection criteria after detail history and clinical general and systemic examination of the patients. Patients will be investigated for routine investigations such as CBC, ESR, RFT, RBS, LFT, PBF, VIT B12 LEVEL, Dengue profile and MP card test. Clinical features, haematological and biochemical parameters and vitamin B12 levels will be measured. Data processing were performed using excel software.

***Corresponding Author:** Dr. Yogesh Kansara
Department of Medicine, National Institute of Medical Sciences and Research, NIMS University, NH-11C, Delhi - Jaipur Expy, Shobha Nagar, Jaipur, Rajasthan 303121, India

RESULT

125 patients were collected. In out of 125 patients, 75 patients have dengue fever and 50 patients have malaria fever.

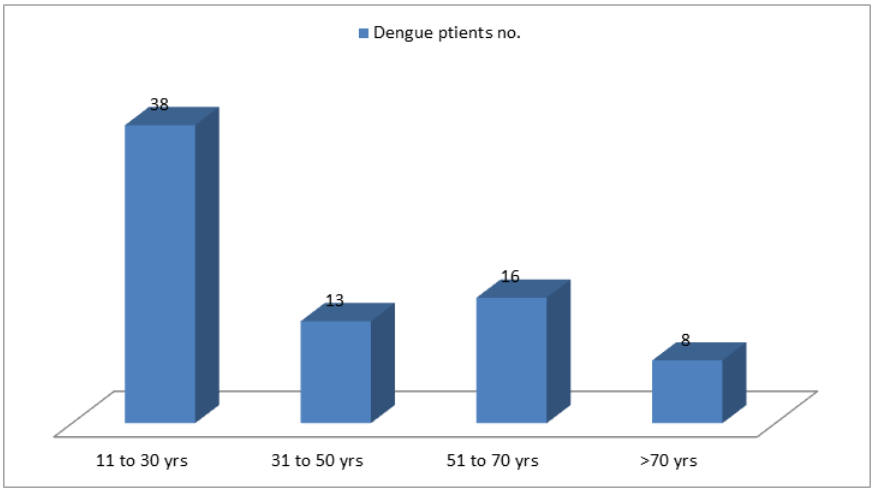

Fig 1: Age distribution of dengue patients

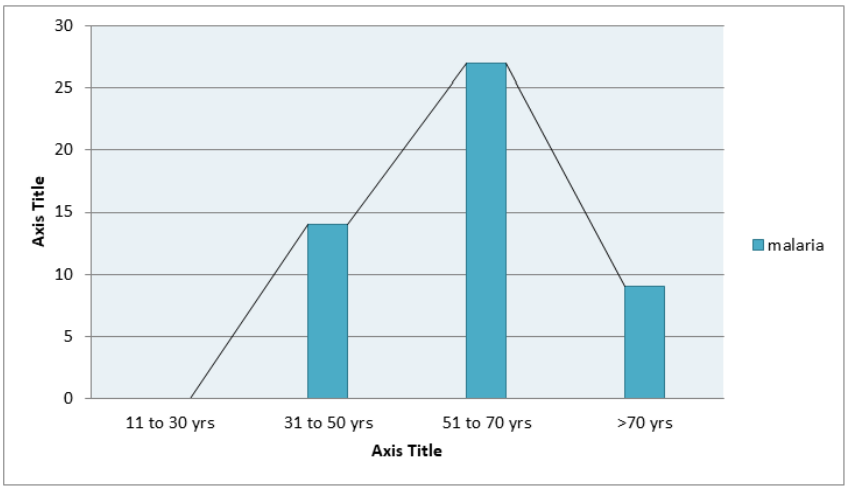

Fig 2: Age distribution of malaria patients

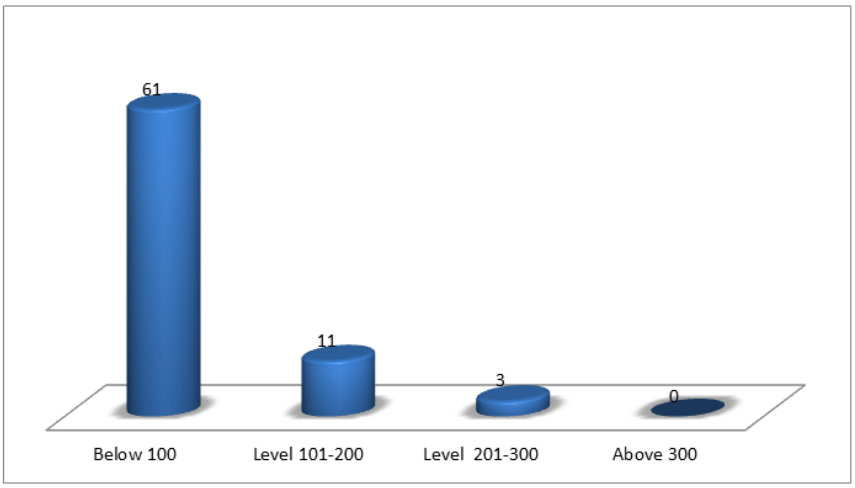

Fig 3: Diagram showing vitamin B12 level in the cases of dengue patients

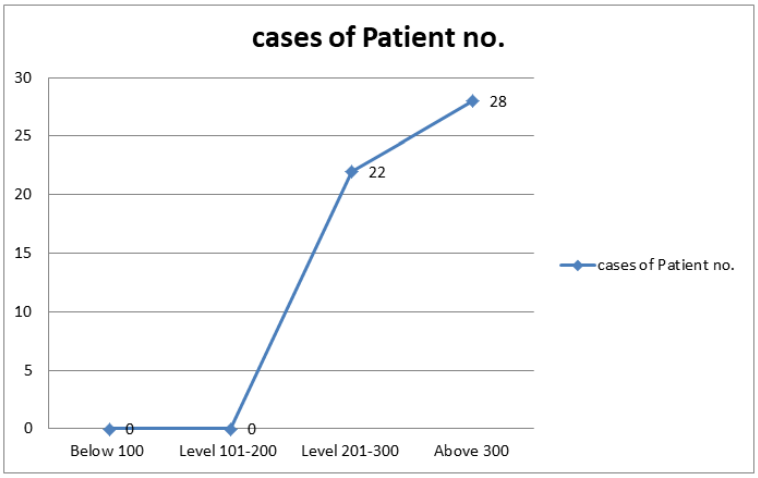

Fig 4: Diagram showing vitamin B12 level in the cases of malaria patients

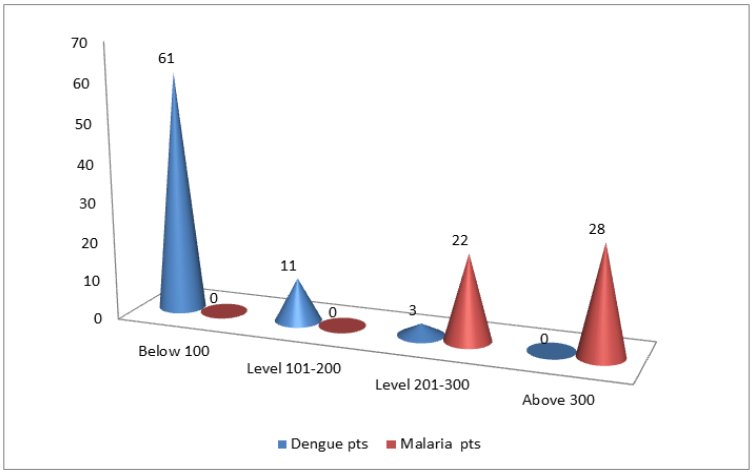

Fig 5: Diagram showing vitamin B12 level in the both cases of dengue and malaria patients

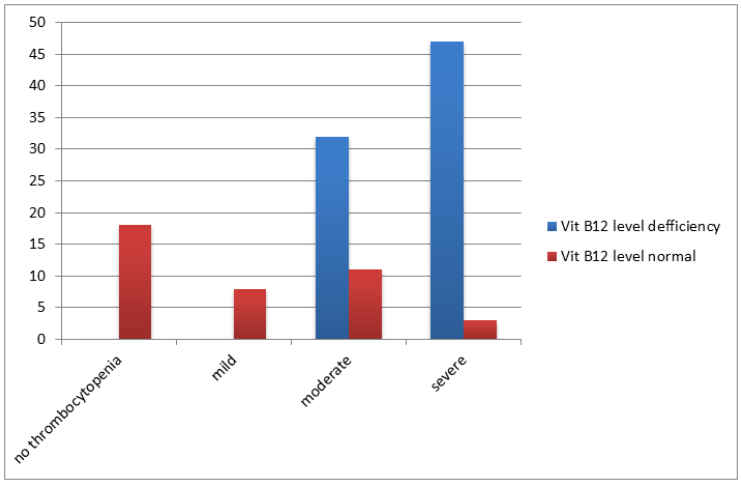

Fig 6: Association between vitamin B12 level and platelets counts

DISCUSSION

In this study showed that vitamin B12 level deficiency in patients with thrombocytopenia. There are 125 patients with dengue fever, and 50 patients with malaria, out of whom 75 are infected. In dengue fever out of 75 patients, 61 patients (81%) have thrombocytopenia with vitamin B12 deficiency (B12 level 300 pg/l), 22patients (44%) have thrombocytopenia with vitamin B12 level normal (B12 level 201-300). Vitamin B12 level < 190 pg/ml was found in 47(94%) patients with severe thrombocytopenia while 32 number (74%) patients with mild thrombocytopenia. In group with B12<190 pg/ l

need of SDP transfusion was significantly high i.e; (115.13±42.08) in comparison to other groups, as well as the recovery time of platelets to 20000/µl threshold, was found to be high in B12<190 pg/l group (42.60±8.89days) as compared to other groups. In this study the finding were platelets analysis by PBF examination the platelets are normal in size, colour and shape as well as shown no presence of platelet clumping. Patients with dengue are often admitted because of thrombocytopenia and other symptoms relating to thrombocytopenia. In India, the duration of admission is often determined by the number of platelets recovered to a safe level (<20000/l). There is no direct correlation between thrombocytopenia severity and dengue complications in several studies. The recovery from thrombocytopenia in some dengue patients is swift, while in others it may take several days. The hypothesis presented in this study was that there may be other factors contributing to acute haematological / hematopoietic stress that lead to thrombocytopenia and slow recovery. By identifying and removing contributory factors, patients with severe thrombocytopenia and dengue fever may be able to decrease the duration of their hospital stay. The severe lack of vitamin B12 is often associated with thrombocytopenia, as well as anemia and leukopenia. The Indian population is prone to vitamin B12 deficiency; therefore, this study was designed to test the hypothesis that the level of vitamin B12 in some people, may lead to prolonged, severe thrombocytopenia. When vitamin B12 levels were under 100 pg/L, SDP requirements were the highest in comparison to those with B12 levels >300 pg/L, but it was not statistically significant. SDP was transfused only if platelets remained below 10000/l in current study, suggesting severe B12 deficiency prolongs severity of thrombocytopenia. An additional parameter measured, the platelats recovery time (time taken to reach >20000/l), confirmed this finding. It was selected as part of in-patient treatment since the platelets recover above 20000/l and if, in all other respects, the patient is considered fit to be discharged. Also, platelet recovery time was the fastest in B12300 pg/L (360±0days) based on statistical analysis.

STUDY LIMITATIONS

Patients with severe thrombocytopenia were tested for vitamin B12 levels in order to test our hypothesis. As a result, the sample size was small. This preliminary conclusion needs to be confirmed in a larger study. In order to determine vitamin B12 levels in large cohorts of dengue patients, plot them against platelet levels would be the most practical approach. The next step would be to see how these patients respond to injectable B12 supplementation. A mild to moderate form of thrombocytopenia often accompanies malaria, but it is rarely symptomatic. In our study, 56% of patients with malaria had thrombocytopenia, similar to others reporting low platelet counts of 57%9 and 48%. Malaria is usually associated with reduced blood counts of various degrees. There were 145 malaria patients in Liberia studied by Mahmood *et al*., There were 109 cases of thrombocytopenia (75.18%). The sensitivity of the platelet count as a malaria predictor was 80.11%, while the specificity was 81.36%. He concluded the extended search for malarial parasite in patients with thrombocytopenia on smear had a positive predictive value of 63.87% and a negative predictive value of 90.86%. In hospitalized patients, thrombocytopenia ranged from mild to severe, raising the possibility of malaria, due to the presence of P falciparum.

CONCLUSION

In dengue fever, there is a particularly high prevalence of thrombocytopenia, especially among Indians, which has been linked to vitamin B12 deficiency. B12 deficiency may require a prolonged hospital stay and increased healthcare costs as well as platelet transfusions. Thrombocytopenia is a common symptom of malaria, and typically occurs more frequently in F. malaria. It appears that P. vivax does trigger thrombocytopenia, contrary to popular belief. Therefore, patients with low platelets and fever ought to be considered for malaria, though B12 deficiency does not always accompany malaria cases.

REFERENCES

- Stover, P. J. (2004). Physiology of folate and vitamin B 12 in health and disease. *Nutrition reviews*, *62*(suppl_1), S3-S12.
- Nath, S. D., Koutoubi, S., & Huffman, F. G. (2006). Folate and vitamin B12 status of a multiethnic adult population. *Journal of the National Medical Association*, *98*(1), 67-72.
- Oh, R. C., & Brown, D. L. (2003). Vitamin B12 deficiency. *American family physician*, *67*(5), 979-986.
- Reynolds, E. (2006). Vitamin B12, folic acid, and the nervous system. *The lancet neurology*, *5*(11), 949-960.
- Piyush, J., Manish, P. G., & Mandhuhingroni. (2017). Isolated thrombocytopenia in acute malaria associated with vitamin B12 and folic acid levels, 4(1), 125-127.
- Khan, S. J., Khan, F. R., Usman, M., & Zahid, S. (2008). Malaria can lead to thrombocytopenia. *Rawal Med J*, *33*(2), 183-185.
- Faseela, T. S., Roche, R. A., Anita, K. B., Malli, C. S., & Rai, Y. (2011). Diagnostic value of platelet count in malaria, *Journal of Clinical and Diagnostic Research*, 5(3), 464-466.
- Leikin, S., & Vossough, P. (1967). 53 The Role of Folate and Vitamin B12 in the Etiology of the Thrombocytopenia of Iron Deficiency Anemia. *Pediatric Research*, *1*(3), 214.
- Ryan, D. H., & Cohen, H. J. (2002). Bone marrow aspiration and morphology. In: Hoffman, R., Benz,

E. J., Sheathbill, S. J., Furles, B., Cohen, H. J., Silberstein, L. E. edts. Haematologybasic principles and practice, 3rdedn. Philadelphia: Churchil Livingstone, 2460-248.

- Aster, J. C. (2004). Red blood cell and bleeding disorders. In: Kumar, V., Abbas, A. K., Faustro, N. edts. Robbins pathological basis of disease, 7th edn. New Delhi: Saunders, 620-622.
- Marris, M. W., & Davey, F. R. (2001). Basic Examination of blood. In: Henry, J. B. edt, Clinical diagnosis and management by laboratory methods, 20thedn. New Delhi: WB Saunders, 520-541.
- Raina, V., Sharma, A., Gujral, S., & Kumar, R. (1998). Plasmodium vivax causing pancytopenia after allogeneic blood stem cell transplantation in CML. *Bone marrow transplantation*, *22*(2), 205-206.
- Wilkins, B. S., & Clark, D. (2003). Recent advance in bone marrow pathology. In; Lowe DG, Underwood JCE edts. Recent advance in histopathology number 20. London, Royal Society Med press Ltd, 145-161.
- Leikin, S., & Vossough, P. (1967). 53 The Role of Folate and Vitamin B12 in the Etiology of the Thrombocytopenia of Iron Deficiency Anemia. *Pediatric Research*, *1*(3), 214-214.
- Chapuis, T. M., Favrat, B., & Bodenmann, P. (2009). Cobalamin deficiency resulting in a rare haematological disorder: a case report. *Journal of Medical Case Reports*, *3*(1), 1-5.
- Tadakamalla, A. K., Talluri, S. K., & Besur, S. (2011). Pseudo-thrombotic thrombocytopenic purpura: a rare presentation of pernicious anemia. *North American Journal of Medical Sciences*, *3*(10), 472-474.
- Sivaprasad, M., Shalini, T., Balakrishna, N., Sudarshan, M., Lopamudra, P., Suryanarayana, P., ... & Reddy, G. B. (2016). Status of vitamin B12 and folate among the urban adult population in South India. *Annals of Nutrition and Metabolism*, *68*(2), 94-102.
- Bansal, P. G., Toteja, G. S., Bhatia, N., Vikram, N. K., Siddhu, A., Garg, A. K., & Roy, A. K. (2015). Deficiencies of serum ferritin and vitamin B. *International Journal for Vitamin and Nutrition Research*, *85*(1-2), 14-22.
- Kularatne, S. A. M., Gawarammana, I. B., & Kumarasiri, P. R. V. (2005). Epidemiology, clinical features, laboratory investigations and early diagnosis of dengue fever in adults: a descriptive study in Sri Lanka. *Southeast Asian Journal of Tropical Medicine and Public Health*, *36*(3), 686-692.
- Andrès, E., Affenberger, S., Zimmer, J., Vinzio, S., Grosu, D., Pistol, G., ... & Blickle, J. F. (2006). Current hematological findings in cobalamin deficiency. A study of 201 consecutive patients with documented cobalamin deficiency. *Clinical & Laboratory Haematology*, *28*(1), 50-56.
- Keskin, E. Y., & Keskin, M. (2015). Severe vitamin B12 deficiency in a 15-year-old boy: presentation with haemolysis and pancytopenia. *Case Reports*, *2015*, bcr2015209718.
- Stabler, S. P. (2013). Vitamin B12 deficiency. *New England Journal of Medicine*, *368*(2), 149-160.
- Scully, M., Cataland, S., Coppo, P., De La Rubia, J., Friedman, K. D., Kremer Hovinga, J., ... & Westwood, J. P. (2017). Consensus on the standardization of terminology in thrombotic thrombocytopenic purpura and related thrombotic microangiopathies. *Journal of thrombosis and haemostasis*, *15*(2), 312-322.
- Andrès, E., Affenberger, S., Zimmer, J., Vinzio, S., Grosu, D., Pistol, G., ... & Blickle, J. F. (2006). Current hematological findings in cobalamin deficiency. A study of 201 consecutive patients with documented cobalamin deficiency. *Clinical & Laboratory Haematology*, *28*(1), 50-56.
- Tran, P. N., & Tran, M. H. (2018). Cobalamin deficiency presenting with thrombotic microangiopathy (TMA) features: a systematic review. *Transfusion and Apheresis Science*, *57*(1), 102-106.
- Chhabra, N., Lee, S., & Sakalis, E. G. (2015). Cobalamin deficiency causing severe hemolytic anemia: a pernicious presentation. *The American Journal of Medicine*, *128*(10), e5-e6.
- Acharya, U., Gau, J. T., Horvath, W., Ventura, P., Hsueh, C. T., & Carlsen, W. (2008). Hemolysis and hyperhomocysteinemia caused by cobalamin deficiency: three case reports and review of the literature. *Journal of hematology & oncology*, *1*(1), 1-5.
- Waheed, M. A., & Elzouki, A. (2018). Vitamin B12 deficiency presenting as hemolytic anemia. *Libyan Journal of Medical Sciences*, *2*(3), 114-115.
- Noël, N., Maigné, G., Tertian, G., Anguel, N., Monnet, X., Michot, J. M., ... & Lambotte, O. (2013). Hemolysis and schistocytosis in the emergency department: consider pseudothrombotic microangiopathy related to vitamin B12 deficiency. *QJM: An International Journal of Medicine*, *106*(11), 1017-1022.
- Park, W. C., & Chang, J. H. (2014). Clinical implications of methylenetetrahydrofolate reductase mutations and plasma homocysteine levels in patients with thromboembolic occlusion. *Vascular Specialist International*, *30*(4), 113-119.
- Tun, A. M., Myint, Z. W., Hernandez, C. R., Guevara, E., Thein, K. Z., & Oo, T. H. (2017). Vitamin B12 deficiency-related pseudo-thrombotic microangiopathy might be misdiagnosed and treated with plasma product therapy: review of the literature and analysis of the reported cases. *Blood*, *130*, 5576.

- Garderet, L., Maury, E., Lagrange, M., Najman, A., Offenstadt, G., & Guidet, B. (2003). Schizocytosis in pernicious anemia mimicking thrombotic thrombocytopenic purpura. *The American journal of medicine*, *114*(5), 423-425.
- Bakchoul, T., & Sachs, U. J. (2015). Platelet destruction in immune thrombocytopenia. Understanding the mechanisms. *Hamostaseologie*, *36*(3), 187-194.
- Van Leeuwen, E. F., Van Der Ven, J. T., Engelfriet, C. P., & Von Dem Borne, A. E. (1982). Specificity of autoantibodies in autoimmune thrombocytopenia. *Blood*, 59(1), 23-26.
- He, R., Reid, D. M., Jones, C. E., & Shulman, N. R. (1994). Spectrum of Ig classes, specificities, and titers of serum antiglycoproteins in chronic idiopathic thrombocytopenic purpura. *Blood*, 83(4), 1024–1032.
- Audia, S., Santegoets, K., Laarhoven, A. G., Vidarsson, G., Facy, O., Ortega-Deballon, P., ... & Radstake, T. R. (2017). Fcγ receptor expression on splenic macrophages in adult immune thrombocytopenia. *Clinical & Experimental Immunology*, *188*(2), 275-282.
- Roark, J. H., Bussel, J. B., Cines, D. B., & Siegel, D. L. (2002). Genetic analysis of autoantibodies in idiopathic thrombocytopenic purpura reveals evidence of clonal expansion and somatic mutation. *Blood, The Journal of the American Society of Hematology*, *100*(4), 1388-1398.
- Kuwana, M., Okazaki, Y., Kaburaki, J., Kawakami, Y., & Ikeda, Y. (2002). Spleen is a primary site for activation of platelet-reactive T and B cells in patients with immune thrombocytopenic purpura. *The Journal of Immunology*, *168*(7), 3675-3682.
- Kuwana, M., Kawakami, Y., & Ikeda, Y. (2003). Suppression of autoreactive T-cell response to glycoprotein IIb/IIIa by blockade of CD40/CD154 interaction: implications for treatment of immune thrombocytopenic purpura. *Blood, The Journal of the American Society of Hematology*, *101*(2), 621-623.
- McMillan, R., Wang, L., Tomer, A., Nichol, J., & Pistillo, J. (2004). Suppression of in vitro megakaryocyte production by antiplatelet autoantibodies from adult patients with chronic ITP. *Blood*, *103*(4), 1364-1369.
- Chang, M., Nakagawa, P. A., Williams, S. A., Schwartz, M. R., Imfeld, K. L., Buzby, J. S., & Nugent, D. J. (2003). Immune thrombocytopenic purpura (ITP) plasma and purified ITP monoclonal autoantibodies inhibit megakaryocytopoiesis in vitro. *Blood*, *102*(3), 887-895.
- Olsson, B., Andersson, P. O., Jernås, M., Jacobsson, S., Carlsson, B., Carlsson, L., & Wadenvik, H. (2003). T-cell-mediated cytotoxicity toward platelets in chronic idiopathic thrombocytopenic purpura. *Nature medicine*, *9*(9), 1123-1124.
- Mert, A., Ozaras, R., Tabak, F., Bilir, M., Ozturk, R., & Aktuglu, Y. (2003). Malaria in Turkey: a review of 33 cases. *European journal of epidemiology*, *18*(6), 579-582.
- Mahmood, A., & Yasir, M. (2005). Thrombocytopenia: a predictor of malaria among febrile patients in Liberia. *Infect Dis J*, *14*, 41-44.
- Memon, A. R., & Afsar, S. (2006). Thrombocytopenia in hospitalized malaria patients. *Pakistan Journal of Medical Sciences*, *22*(2), 141-143.
- Akhtar, M. N., Jamil, S., Amjad, S. I., Butt, A. R., & Farooq, M. (2005). Association of malaria with thrombocytopenia. *Annals of King Edward Medical University*, *11*(4), 536-537.
- Rehman, Z. U., Alam, M., Mahmood, A., Mubarik, A., Sattar, A., & Karamat, K. A. (1999). Thrombocytopenia in acute malarial infection. *Pakistan Journal of Pathology*, *10*, 9-11.
- Jamal, A., Memon, I. A., & Lateef, F. (2007). The association of Plasmodium Vivax malaria with thrombocytopenia in febrile children. *Pak Paed J*, 31, 85-89.
- Kumar, A. (2006). Thrombocytopenia--an indicator of acute vivax malaria. *Indian journal of pathology & microbiology*, *49*(4), 505-508.
- International Committee for Standardization in Haematology. (1971). Proposed recommendations for measurement of serum iron in human blood. *Br J Haemalol*, 20.
- Scott, J. M., Ghanta, V., & Herbert, V. (1974). Trouble-free microbiologic serum and red cell folate assays. *The American journal of medical technology*, *40*(3), 125-134.
- Anderson, B. B. (1964). Investigations into the Euglena method for the assay of the vitamin B12 in serum. *Journal of Clinical Pathology*, *17*(1), 14-26.
- Wintrobe, M. M., Lee, G. R., & Boggs, D. R. (1981). In: Clinical Haematology, Philadelphia, Lea & Febiger. 8th ed. p. 1054 determination of platelet aggregation. *Am J Clin Pathol*, 125-134.
- Levine, P. H. The effect of thrombocytopenia on the, 65, 79-82.
- Smith, M. D., Smith, D. A., & Fletcher, M. (1962). Haemorrhage associated with thrombocytopenia in megaloblastic anaemia. *British Medical Journal*, *1*(5283), 982.

Cite This Article: Yogesh Kumar Kansara & Eshan Sharma (2022). To Study of the Correlation between Vitamin B12 Level and Thrombocytopenia in Dengue Fever and Malaria. *East African Scholars J Med Sci*, *5*(2), 29-34.