RESEARCH ARTICLE

Correlation of Vitamin B_{12} Levels with Degree of Thrombocytopenia in Dengue Patients

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Abstract

Introduction: Dengue fever, commonly known as breakbone fever is the most common arboviral mosquito-borne disease in the world. Aims of the study was to find any correlation of vitamin B_{12} levels with the degree of thrombocytopenia in dengue patients.

Materials and methods: A hospital-based study from January 2019 to June 2020 at the Department of General Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur. The study was done on dengue fever patients with severe thrombocytopenia (<50,000 µL and >2 days duration).

Results: Mean platelet count in patients with ≤200 pg/mL vitamin B_{12} was 38,653.06 ± 6362.49 per mL and in patients with >200 pg/mL vitamin B_{12} was 40,564.35 ± 61.04.78 per mL. Mean platelet recovery in patients with ≤200 pg/mL vitamin B_{12} was 7.00 ± 1.04 days and in patients with >200 pg/mL vitamin B_{12} was 4.33 ± 0.59 days. Mean hospital stay in patients with ≤200 pg/mL vitamin B_{12} was 7.96 ± 0.71 days and in patients with >200 pg/mL, vitamin B_{12} was 4.49 ± 0.50 days.

Conclusion: Vitamin B_{12} deficiency may be a contributing factor to the development of severe thrombocytopenia in dengue fever, particularly in the Indian population. Vitamin B_{12} deficiency may prolong the hospital stay and increase the platelet recovery time.

Keywords: Dengue, Platelet count, Vitamin B_{12}.

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Introduction

Dengue fever, commonly known as breakbone fever is the most common arboviral mosquito-borne disease in the world. Many countries especially the countries of the Indian subcontinent have suffered from the disease. Indian subcontinental epidemiology of dengue fever is highly complex. It has changed over the last few years with regard to the strains, affected regions, and disease severity.[1]

Laboratory tests for thrombocytopenia might include complete blood count, liver fiction tests (liver enzymes, to be more specific), renal function, serum vitamin B_{12} levels, folic acid levels, erythrocyte sedimentation rate, and peripheral blood film. If the cause for the low platelet count remains unclear, a bone marrow biopsy is usually recommended to differentiate cases of decreased platelet production from cases of peripheral platelet destruction.[2]

There are no large epidemiological studies present to assess serum B_{12} level in the Indian population but few studies suggest that serum vitamin B_{12} deficiency is very common in the Indian population with a prevalence range of 35–60%. Vitamin B_{12} is an important factor required for thrombopoiesis and erythropoiesis. Approximately 10% of patients with symptomatic B_{12} (cobalamin deficiency) have significant thrombocytopenia.[3]

Previously, no study has been done explaining the relationship between vitamin B_{12} deficiency and thrombocytopenia in dengue patients. So, we conducted this study to find out the relation between the two.

Materials and Methods

- Type of study: A hospital-based study.
- Period of study: January 2019 to June 2020.
- Place of study: Department of General Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur.
- Institute Ethics Committee approval to be obtained before the start of the study.
- Written and informed consent of the patients will be obtained from all participants before enrolment into the study.

Sample Size

All patients admitted with dengue fever in the Department of General Medicine, Mahatma Gandhi Hospital from January 2019 to June 2020 was included in the study.

Plan of Study

Inclusion criteria:

- The study was done on dengue fever patients with severe thrombocytopenia (<50,000 µL and >2 days duration).
- Adult patients aged 18–50 years who test positive for NS1 antigen/IgM/ ELISA/PCR for dengue.

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Conflict of interest: None

Exclusion criteria:

- Patients aged less than 18 years or over the age of 50 years.
- Patients with underlying malignancy, hematological disorders, septicemia, the use of any drug causing thrombocytopenia.

Methodology

- Clinical features, hematological, and biochemical parameters will be noted and vitamin B_{12} levels would be measured.
- Single donor platelets (SDP) transfusion will be done if the patient is actively bleeding or if the platelet level is less than 10,000/ µL.
- For the analysis purpose, patients would be divided into two groups according to B_{12} level were, viz, B_{12}<200 pg/L and B_{12}>200 pg/L.
- Serial CBC will be done daily and platelet trends will be observed in patients with and without B_{12} deficiency.

Statistical Analysis

Standard statistical methods will be used to analyze the data. Patients' characteristics will be expressed as mean ± SD for continuous variables and they will be compared using the Chi-square test.

Results

In the present study, 57.33% of patients were from the 31–40 years age group followed by 26.00% of patients were from the 18–30 years age group, and 16.67% patients were from more than 40 years age. About 73.33% of patients were male and 27.67% of patients were female (Table 1).

In our study, the mean platelet count in patients with ≤200 pg/mL vitamin B_{12} was 38,653.06 ± 6362.49 per mL and in patients with >200 pg/mL vitamin B_{12} was 40,564.35 ± 61.04.78 per mL. The association between vitamin B_{12} and platelet count was statistically insignificant (Table 2).

In our study, mean platelet recovery in patients with ≤200 pg/mL vitamin B_{12} was 7.00 ± 1.04 days and in patients with >200 pg/mL vitamin B_{12} was 4.33 ± 0.59 days. The association between vitamin B_{12} and platelet recovery was statistically significant (Table 3).

In our study, mean hospital stay in patients with ≤200 pg/mL vitamin B_{12} was 7.96 ± 0.71 days and in patients with >200 pg/mL vitamin B_{12} was 4.49 ± 0.50 days. The association between vitamin B_{12} and platelet recovery was statistically significant.

Discussion

This hospital-based study has been conducted at the Department of General Medicine, Mahatma Gandhi Medical College and Hospital, Jaipur from January 2019 to June 2020. A total of 150 patients were admitted with Dengue fever in the department of General Medicine, Mahatma Gandhi Hospital from January 2019 to June 2020 included in the study.

In the present study, 67.33% of patients' vitamin B_{12} level was more than 200 pg/mL, and 32.67% of patients' B_{12} level was ≤200 pg/mL.

The surrounding area and the drainage area of nearby and distant villages are agriculturally rich with a decent standard of living. The local population is predominantly vegetarian. Vitamin B_{12} is not available in plant-based foods and only dairy-based foods are a source of vitamin B_{12} in this population. In dairy foods, only milk and milk-based products are commonly consumed locally.

Sandeep Tak et al.[4] found that 40% of subjects were having B_{12} level <200 pg/mL and 72% of the patients had B_{12} level <300 pg/mL and the mean B_{12} level was 336.9 ± 362.36 pg/mL.

In our study, the mean platelet count in patients with ≤200 pg/mL vitamin B_{12} was 38,653.06 ± 6362.49 per mL and in patients with >200 pg/mL vitamin B_{12} was 40,564.35 ± 61.04.78 per mL. The association between vitamin B_{12} and platelet count was statistically insignificant.

Sandeep Tak et al.[4] found that the requirement for SDP was highest (3.0 ± 1.41) in a group with vitamin B_{12} level less than 100 pg/mL as compared to the group with vitamin B_{12} levels more than 300 pg/mL (1.36 ± 1.2860), although it was not statistically significant. This suggests that severe vitamin B_{12} deficiency may prolong the severity of thrombocytopenia (in the current study SDP was transfused only if platelets persisted below 10,000/µL.).

Deshpande SV et al.[5] found that serum B_{12} levels were significantly low in 31 patients who did not undergo marrow biopsy. The commonest cause in this study was megaloblastic anemia 58 (57.7%) patients. Bone marrow was hyper-cellular in the majority of cases with megaloblastic erythropoiesis. Megaloblastic anemia occurring due to vitamin B_{12} or folic acid deficiency is a well recognized and established cause of cytopenia. It can either present as pancytopenia or bicytopenia or rarely with thrombocytopenia only.

In our study, mean platelet recovery in patients with ≤200 pg/mL vitamin B_{12} was 7.00 ± 1.04 days and in patients with >200 pg/mL vitamin B_{12} was 4.33 ± 0.59 days. The association between vitamin B_{12} and platelet recovery was statistically significant.

Sandeep Tak et al.[4] also found that platelet recovery time was also maximum in B_{12} <100 pg/mL group (5.75 ± 0.95 days) as compared to the group with B_{12} >300 pg/mL (3.0 ± 0 days) and it was statistically significant. As it is clear from Table 3, the more severe the vitamin B_{12} deficiency, the more prolonged was the platelet recovery time.

In our study, mean hospital stay in patients with ≤200 pg/mL vitamin B_{12} levels were 7.96 ± 0.71 days and in patients with >200 pg/mL vitamin B_{12} it was 4.49 ± 0.50 days. The association between vitamin B_{12} and platelet recovery was statistically significant.

Table 1: Association between vitamin B_{12} and platelet count

	Platelet count (per mL)	
Vitamin B_{12} (pg/mL)	*Mean*	*SD*
≤200	38,6530.06	6362.49
> 200	40,5640.35	61.04.78
t-value	1.77	
p-value	0.07	

Table 2: Association between vitamin B_{12} and platelet recovery

	Platelet recovery (day)	
Vitamin B_{12} (pg/mL)	*Mean*	*SD*
≤200	7.00	1.04
> 200	4.33	0.59
t-value	19.68	
p-value	0.001	

Table 3: Association between vitamin B_{12} and hospital stay

	Hospital stay	
Vitamin B_{12}	*Mean*	*SD*
≤200	7.96	0.71
> 200	4.49	0.50
t-value	34.62	
p-value	0.001	

Sandeep Tak et al.[4] also found that hospital stay (in.days) was also highest in vitamin B_{12} <100 pg/mL group (5.25 ± 1.25 days) as compared to the group with B_{12} >300 pg/mL (3.64 ± 0.5 days) and it. was statistically significant.

Conclusion

Vitamin B_{12} deficiency may be a contributing factor to the development of severe thrombocytopenia in dengue fever, particularly in the Indian population. Vitamin B_{12} deficiency may prolong the hospital stay and increase the platelet recovery time.

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