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Diagnostic value of ferritin for the severity of dengue infection in children

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Article Info

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Abstract

The study was conducted to evaluate whether the severity of dengue fever can be predicted by serum ferritin level or not. This prospective observational study was conducted during the endemic period of dengue fever in 2019. A total of 30 diagnosed ...ses of dengue fever who presented with bicytopenia during febrile phase of the disease ...e enrolled in this study. Pearson's correlation coefficient was calculated to compare ferritin le... with lowest platelet count and highest hematocrit level and it showed that there was signific... correlation. There was no difference between the lowest total count of white blood cell a... serum ferritin level. The severity of dengue fever can be predicted by raised level of serum fer...tin.

Introduction

Dengue fever is a dynamic febrile illness which can manifest as a mild self-limiting or ...ere life threatening situation following hemorrhage, plasma leakage, or multip... organ failure.[1-3] Now-a-days, it is endemic ... more than 100 countries in We... Pacific, Latin America, Southeast Asia, Easte... Mediterranean regions and Africa. It is esti...ted that although annually worldwide 9... millions human beings ...e clinical ...anifestation of deng... fever, 39... illions people suffer from dengu... ...ctions.[4-7]

The se...er... of dengue fever depends on the i... ...tions ...tween virus and host's immune respo...e.[8]

Now-a-days, many hematological parameters have been suggested to evaluate the severity of ... ...se including decreased platelet count, raised hematocrit level, prolonged prothombin time and activated partial thromboplastin time, liver transaminases, muscular enzymes, cytokines such as IL-6 and IL-10,[9-15] but there is paucity of researches which can predict bad outcome in dengue fever. Studies conducted by Zhang et al. (2014)[16] at the Caribbean island Aruba; Chaiyaratana et al. (2008)[17] at Thailand concluded that elevated ferritin level in serum is a distinguishing feature of dengue fever. Thanachartwet et al. (2015)[18] and Chaloemwong et al. (2018)[19] concluded that high hematocrit, thrombocytopenia and leukopenia were associated with severity of the disease. One of the effects of inappropriate activation of tissue macrophages is macrophage activation syndrome and could be responsible for morbidity a... ...d m...tality in dengue fever. Serum ferritin, an acut... ...hase r...actant protein, is a surrogate ...rker of ...acrophage activa-tion.[20] Elevated le... of s...rum ferritin during the febrile phase of d... ...e fever might predict the severity of dengue fever during critical phase which would help physicians to prepare for the prevention and treatment of extended dengue fever. Thus, it can reduce the morbidity and mortality in dengue fever[20].

During the endemic period of dengue outbreak in Bangladesh, it was rational to conduct this study to early pickup of lethal cases which was helpful for the prevention of mortality and morbidity.

In this study, we assessed the relationship of serum ferritin concentration with the highest hematocrit, lowest platelet and total white blood cell count.

Materials and Methods

This study was conducted from June to August, 2019. In total 30 diagnosed cases of dengue fever (Dengue NS 1 positive) who developed bicytopenia during febrile phase of the illness[7,8] were included for the study. All participants later developed features of volume overloads in the form bilateral pleural effusions and ascites which resolved at variable period of time. The serum ferritin level was measured from 1 mL venous blood sample during the 4th or 5th day of onset of febrile phase of the illness (by electrochemiluminescence immunoassay-COBAS e411).

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On a daily basis, disease progression and complete blood count were monitored carefully.

The patients were classified as having non-severe and severe infection as per National guideline of dengue fever.[21]

Statistical analysis

The chi-squared test was done to compare the values of serum ferritin concentration with other parameters of the blood. Additionally Two-tailed, unpaired student's t test was done to compare the means of different variables Proportions were compared by means of the two-tailed, Fisher's exact test. Correlations between the variables were analyzed by Pearson correlation.

Results

Figure 1A shows the positive correlation of serum ferritin and high hematocrit value. Pearson correlation value was 0.661. The result was statically significant (p=0.000).

Figure 1B shows the negative correlation of serum ferritin and lowest platelet count. Pearson correlation value was –0.348. The result was statically significant (p=0.05).

Figure 1C shows negative correlation of serum ferritin and lowest total count of white blood cell count. Pearson correlation value was –0.172. the result was not statically significant (p=

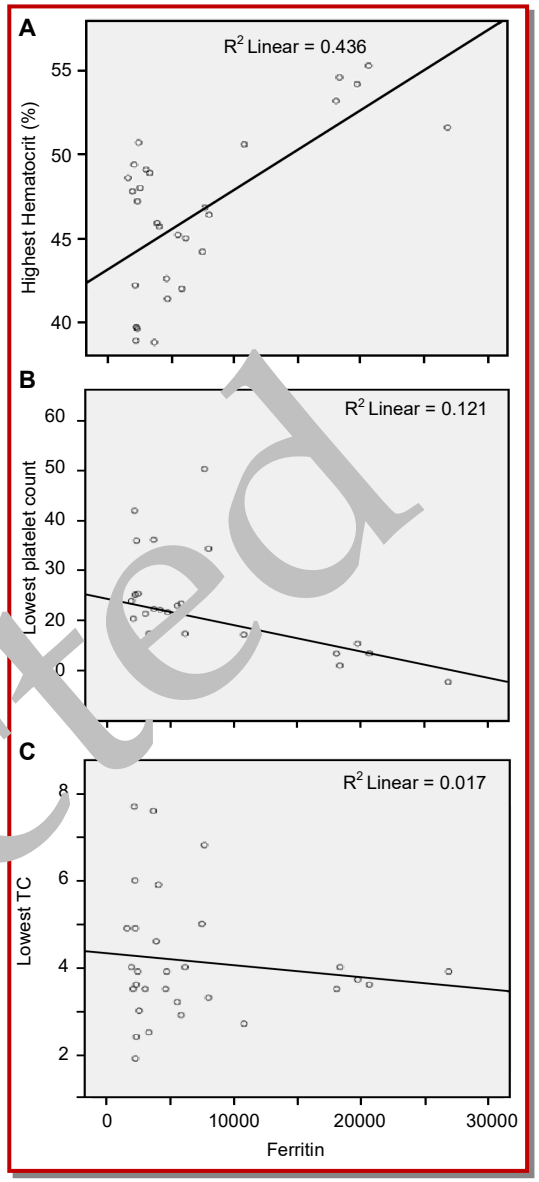

Figure 1: Correlation of serum ferritin level with serum haematocrit level (A), lowest platelet count (B) and lowest total count of white blood cell (C)

Discussion

In the present study, we found that higher serum ferritin level during febrile phase, significantly associated with lower platelet count and higher hematocrit level during critical period of dengue fever which ultimately correlate with the severity of the disease. Similar findings were noted in other studies as well. In South India, Soundravally et al. (2015)[22] conducted a research work on 96 febrile patients equally divided into dengue and non-dengue groups. The plasma ferritin levels were monitored on 4th and 8th day of the onset of fever. Ferritin level was significantly raised in severe dengue fever both in febrile and afebrile phases (p value 0.000). In the current study, although we did not compare serum feritin level between the severe and nonsevere dengue fever, we found that higher the level of serum feritin, lower the level of platelet count (p value 0.000). Recently published another study by Petchiappan et al. (2019)[23] at Tamilnaru, India also described similar finding on 119 patients with dengue fever. Evalda et al. (2017)[24] at Indonesia described the association of high serum ferritin level with dengue shock syndrome in children.

Conclusion

High serum ferritin level significantly associated with severe dengue fever.

Ethical Issue

The research protocol was approved by the ethical committee of the United Hospital LTD. Dhaka, Bangladesh.

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Conflict of Interest

There is no conflict of interest.

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