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Study on Liver Enzymes as an Early Predictor of Complicated Dengue Fever in a Tertiary Care Hospital

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ABSTRACT

Aim of the study is to evaluate if elevated liver enzyme levels can be used as an early predictor of severe dengue fever. Of the 300 children who participated in the study, the most prevalent age range was determined to be 6-12 years, with 144 boys and 156 girls. 55% of the study's participants had dengue fever and showed warning signals. 207 (or 69%) of the 300 kids tested positive for IgM Dengue. 297 out of the 300 kids lived. The mortality rate was low, only 1%, being a tertiary care facility with high-quality care and protocol-based management in accordance with WHO 2015 criteria. This is consistent with research done in South East Asia, where a death rate of 1% was also seen. Based on the severity of thrombocytopenia, the study population was separated into 6 groups. Only mild thrombocytopenia (80,000-1,50,000) was present in 29%. A significant p value of <0.05 revealed a positive link between the severity of the disease and the severity of the thrombocytopenia. A significant correlation between the level of SGOT increase and IgM Dengue positive was noted. Additionally, a linear association between the degree of SGOT increase and the seriousness of the sickness was discovered. It was discovered that normal SGOT levels have a strong negative predictive value. Therefore, an early indicator of the severity of the disease can be the rise of the SGOT liver enzyme. Elevated SGPT levels were found to be significantly associated with severe Dengue. The degree of SGPT elevation and sickness severity were found to be correlated linearly. Therefore, increased SGPT levels can be used to estimate the severity of a disease.

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Key Words
SGOT, IgM, dengue

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INTRODUCTION

The most rapidly spreading mosquito borne viral disease of mankind is DENGUE with an increase of global incidence to about 30-40 fold in the five decades. In all of the world's tropical and subtropical regions, it is a serious public health issue. Nearly 50% of the world's population resides in dengue-endemic nations. In a Chinese medical encyclopaedia from the Jin Dynasty (265-420 AD), Dengue disease was originally described as “water poison” in reference to flying insects. The Swahili phrase Ka-dinga pepo, which translates to “cramp-like seizure induced by an evil spirit,” is where the word “dengue” first appeared. The Spanish term “dengue,” which means fastidious or meticulous and would reflect the walk of a person experiencing the bone discomfort associated with dengue infection, may have been the source of the Swahili word “dinga.” Dengue was referred to as “Dandy fever” because slaves in the West Indies who acquired it were said to have the posture and stride of a Dandy[1,2]. In the 1780s, clinical dengue epidemics were first noted, roughly concurrently, in Asia, North America and Africa. Benjamin Rush in Philadelphia reported the first clinical case in 1789. The symptoms, which commonly include myalgia and arthralgia, led him to develop the phrase “break bone fever[3]. Only after 1828 the phrase “Dengue fever” came into use. In recent decades, dengue cases have drastically increased all across the world. Dengue cases are underreported since a large percentage of them are asymptomatic, moderate and self-managed[4,5]. According to a modelling estimate, there are 390 million dengue virus infections worldwide each year (95% credible interval: 284-528 million), of which 96 million (range: 67-136 million) show clinical symptoms (of any degree of illness severity). According to a different study on the incidence of dengue, 3.9 billion people worldwide could contract dengue viruses. Despite the fact that there is a risk of infection in 129 nations, Asia bears a majority of the burden[6-8]. Over the past 20 years, there has been an over 8-fold increase in dengue cases reported to WHO, from 505, 430 cases in 2000 to over 2.4 million in 2010 and 5.2 million in 2019. Between 2000 and 2015, the number of reported deaths increased from 960 to 4032, largely impacting younger age groups[9,10]. The overall number of illnesses and reported deaths both appeared to be declining in the years 2020 and 2021. The data is not yet complete and the COVID-19 pandemic may have made it more difficult for countries to disclose cases in some of them.

MATERIALS AND METHODS

Study Population: All patients who meet the inclusion criteria and are admitted to the paediatric department, ages 1 month to 12 years.

Inclusion Criteria: All patients, ages 1 month to 12 years, were admitted with thrombocytopenia and fever.

Exclusion Criteria: Chronic Liver Disease.

Calculated Sample Size: 200.

Following informed consent, all paediatric patients with fever and thrombocytopenia who were admitted during the trial period were registered for the study. Age, sex, address, presenting problems, clinical characteristics and exam results were all entered into a thorough proforma. At the time of hospitalisation (from days 2 through 6 of fever), laboratory tests such CBC, SGOT and SGPT levels were estimated. Venepuncture is used to collect 1ml of blood and the Sysmex XP-300 automated haematology analyzer is used to analyse the CBC. Kinetic analysis was used to determine SGOT and SGPT. Following six days of fever, an IGM dengue test was conducted on all patients. For signs of dengue shock syndrome or dengue hemorrhagic fever, patients were closely watched. The patient's clinical course, the IgM Dengue report (completed after 6 days of fever) and the final diagnosis made at the time of discharge were used to make the decision.

RESULTS AND DISCUSSIONS

The study involved 300 patients in total. Of these, 214 cases (71.33%) belonged to the age group of 6-12 years, 64 cases (21.33) to the age group of 1-5 and 22 cases (7.33%) were babies, indicating that this age group made up the majority of the study population. Male patients made up 148 (49%) while female cases made up 153 (51%) with a little female advantage. The clinical symptoms and examination results at the time of admission led to the classification of 84 patients (28%) as Probable Dengue, 210 cases (70%) as Dengue fever with warning signs and 10 cases (2%), which were Severe Dengue presenting with shock. Thrombocytopenia and warning symptoms were observed in 68% of the kids. Abdominal pain and soreness are the most common warning signs. Of the children with fever thrombocytopenia, 12% (36 patients) had normal SGOT levels. There was a slight rise of 2 times the normal level in 36% (108 patients). A high enzyme elevation of 2-5 times was present in 39% (117 patients). 39 cases, or 13%, had very severe increases of more than five times. Only 3 deaths occur out of the 300 research participants' children. The mortality rate is 1%. One of the 3 cases of deaths had IgM Dengue positivity, while the other did not. Every victim made a full recovery. None of them developed long-term liver illness or consequences. Final IgM Dengue ELISA testing on 300 research participants revealed 69% (207 cases) of IgM positivity and 31% (93

cases) of IgM negativity. Only IgM dengue positive cases were considered to have dengue fever in accordance with WHO standards. The final diagnosis of dengue did not take into account NS1 Ag positivity alone, IgG Dengue positivity alone, or IgM Dengue results that were ambiguous. Based on the clinical severity and IgM Dengue results, 153 cases (51%) had a final diagnosis of dengue fever with warning signs at the time of discharge, whereas 45 cases (15%) had dengue fever, 9 cases (3%) had severe dengue fever, and 93 cases (31 %) with IgM Dengue negative results had a different diagnosis.

Table 1: Association of Clinical Diagnosis with IgM Dengue Positivity

Clinical Diagnosis	IgM Dengue Positive	IgM Dengue Negative
Probable dengue	58	28
Dengue with warning signs	145	62
Severe dengue	4	3

Table 2: Association OF SGOT Level with IgM Dengue Positivity

SGOT	IgM Positive	IgM Negative
Normal	23	16
<2 times	58	46
2-5 times	85	28
5-15 times	41	3

Table 3: Association OF SGPT with IgM Dengue Positivity

SGPT	IgM Positive	IgM Negative
Normal	70	45
<2 times	79	25
2-5 times	38	20
5-15 times	20	3

In this investigation, out of 300 suspected VHF/dengue patients who presented with thrombocytopenia and a fever lasting >two days, 212 cases tested positive for the disease, while 88 instances did not. The majority of the study's participants were kids between the ages of 6 and 12. Age and gender distribution in the study population did not show any statistically significant association. There was no discernible relationship between age or gender distribution and IgM positive for Dengue or with the severity of the disease. A cut-off platelet count of 1,50,000 was used to diagnose thrombocytopenia. The study group's level of thrombocytopenia was evaluated. 6 categories were used to sub classify thrombocytopenia. 63 cases (21%) had platelet counts between 20,000 and 40,000, 57 cases (19%) had platelet counts between 40,000 and 60,000, 42 cases (14%) had platelet counts between 60,000 and 80,000, 63 cases (21%) had platelet counts between 80,000 and 1,20,000 and 24cases (8%) had platelet counts above 1,20,000. This demonstrates that the majority (29%) only had mild thrombocytopenia, ranging from 80,000-1,50,000. The relationship between IGM Dengue positive and thrombocytopenia severity was also investigated. With a p value of <0.05, it was determined that the degree of thrombocytopenia was correlated statistically significantly with IgM Dengue Positivity. Further research revealed a significant correlation between the severity of the illness and the degree of thrombocytopenia. The association between severe dengue fever and a platelet count of 60,000 or less had a p value of <0.034. SGOT levels were assessed at admission and monitored until full recovery. 36 patients (12%) had normal SGOT levels, 108 (36%) had SGOT elevation of less than two times, 117(39%) had SGOT elevation of two to five times and 39 (13%) had extremely severe elevation of five to fifteen times. This demonstrates that 88% of the kids suspected of having VHF/dengue fever had elevated SGOT values. 95% IgM Dengue positivity was related with an SGOT enzyme increase of 5-15 times, while 75% IgM Dengue positivity was associated with an elevation of 2-5 times. With a p value of <0.01, a significant correlation between SGOT enzyme increase and IgM Dengue positive was discovered. Similar research findings to those of Kaur Ramandeep[11]. A significant p value of <0.05 was discovered to indicate a linear correlation between the degree of SGOT rise and illness severity. Most study participants (37%) had normal SGPT levels, while 108 cases (36%) had levels that were <2 times normal. 60 cases (20%) had SGPT elevations of 2-5 times and 21 cases (7%) had extremely high elevations of 5-15 times. This is in line with studies written by Jagadishkumar K *et al.,* Kaur Ramandeep *et al* and Vaibhav Shukla[12,2]. Severity of SGPT elevation and IGM Dengue positive were not significantly correlated. However, a significant correlation between the level of SGPT elevation and the severity of the sickness was discovered, with a p value of <0.05. Numerous studies, including those by Jagadishkumar K *et al* and Vaibhav Shukla *et al.,* demonstrated the similar pattern of larger SGOT than SGPT rise in dengue patients. This is due to the fact that SGOT, a non-specific measure of liver injury, is raised in both cardiac and muscle injuries. However, SGPT is only increased in hepatic damage, hence there were fewer incidences of SGPT elevation. Out of 300 trial participants, 3 (1%) died. In the study population, there was a 1% death rate. Our ability to provide high-quality tertiary care and manage using protocols in accordance with WHO 2015 guidelines has enabled us to reduce the death rate to 1%.

CONCLUSION

The majority of the study group had elevated SGOT levels, which were found to be significantly correlated with IgM positive for dengue. Additionally, severe types of dengue fever including Dengue Shock syndrome were linked to SGOT levels that were elevated by >5 times. As a result, high SGOT levels within the first week of admission can be used to predict severe dengue fever early on. Dengue severity can be predicted based on the degree of SGOT elevation. Additionally, a substantial linear association between the degree of SGPT elevation and the severity of dengue fever was discovered. As a result, increased SGOT and SGPT levels can be used to predict severe

dengue fever early on. Regular SGOT and SGPT levels both have extremely strong negative predictive values.

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