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Original Research Article

Serum glutamic-oxaloacetic transaminase and serum glutamic pyruvic transaminase ratio as an early predictor to assess dengue severity

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ABSTRACT

Background: Dengue fever is a benign syndrome caused by arthropod borne viruses which is transmitted by infective bite of a particular mosquito known as Aedes aegypti, a day time biting mosquito, which is the principal vector of the disease. Although liver is not a major target organ, hepatic dysfunction is well recognised and can be used as an early predictor to assess the dengue severity by looking at the ratio of serum glutamic-oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT) levels. Studies using SGOT/SGPT ratio to assess severity of dengue were very few, hence the need for the study.
Methods: Ratio of SGOT and SGPT is considered as an early predictor to assess severity of dengue in children admitted under department of paediatrics at Sapthagiri Institute of Medical Sciences and Research Centre, Bangalore. A total of 100 children aged between 0-15 years were admitted with signs and symptoms of dengue. Informed consent was obtained and detailed history was taken. For all cases, dengue serology rapid and ELISA was done at our hospital. Children positive for NS1, IgM, IgM+ IgG were included in the study and ratio of SGOT/SGPT done at the time of admission was taken and followed up for clinical profile.
Results: Children with SGOT/SGPT ratio<1 at the time of admission had lesser duration of hospital stay and complications when compared to children with SGOT/SGPT ratio >1.
Conclusions: SGOT/SGPT ratio at the time of admission can be used to predict dengue severity, duration of hospital stay and outcome.

Keywords: SGOT, SGPT, ELISA

INTRODUCTION

Dengue fever is a disease caused by arthropod borne viruses and is transmitted by infective bite of a mosquito known as *Aedes aegypti*. There are distinct antigenic types of dengue fever such as DV-1, DV-2, DV-3, DV-4 of the family *Flaviviridae*.[1] According to WHO estimates, about 100 million dengue infections occur each year around the world. Benjamin Rush depicted detailed clinical picture and coined the term -break bone fever in 1780 because of symptoms.[2]

Dengue is a dynamic disease beginning with nonspecific, acute febrile illness lasting for 2-5 days (febrile phase), progressing to severe disease during fever defervescence (critical phase) and ending in severe dengue (dengue haemorrhagic fever or dengue shock syndrome) depending upon fluid leak or haemorrhage.[3] About 5% of patients develop severe dengue fever, which is more prevalent after a second or subsequent illness.

After the critical phase of 24-48 hours, the extra vascular fluid is gradually reabsorbed during the next 48-72 hours.

The patient's general well-being improves, regains appetite, gastrointestinal symptoms subside and haemodynamically stabilised.[4]

The new WHO classification of dengue fever in children proposes three categories (i) Dengue without warning signs (ii) dengue with warning signs and (iii) severe dengue. The demonstration of specific antibodies in serum samples by haemagglutination inhibition, complement fixation neutralisation test or ELISA is required for laboratory diagnosis of dengue infection.[5] Haematological parameters like complete blood count shows thrombocytopenia, leucopenia, raise in haematocrit. Liver function test shows raised liver enzymes (SGOT, SGPT) and hypoalbuminemia. Renal function test shows electrolyte imbalance and deranged creatinine. All the above parameters are used to assess the severity of dengue and also to identify the associated complications.

Hepatic dysfunction is well recognised in dengue fever and can be used as an early predictor to assess the dengue severity by looking at the ratio of SGOT and SGPT levels. There were no many studies using this ratio to assess dengue severity. Hence the need for the study.

METHODS

This prospective study was undertaken at Sapthagiri Institute of Medical Science and Research Centre after obtaining approval from Institutional Ethics Committee. This study was conducted from July 2020 to June 2021. Children from 0-15 years of age with clinical features of Dengue infection such as fever, vomiting, maculo-papular rash, headache, abdominal pain, seizures, myalgia, haematemesis, melena or deranged haematological parameters such as (haemoglobin, haematocrit, platelet, LFT, RFT) admitted in Sapthagiri Institute of Medical Sciences and Research Centre during the study period were registered. Informed consent was obtained and detailed history was taken. For all cases, dengue serology rapid and ELISA was done at our hospital. Children positive for NS1, IgM, IgM + IgG were followed up for clinical profile.

Inclusion criteria

Children with age group of 0-15 years admitted with positive dengue serology (N S1 antigen, IgM dengue antibody) by ELISA technique were included.

Exclusion criteria

Isolated IgG positive cases, children with known cause of fever like malaria, rickettsia, chikungunya and chronic liver disease cases were excluded from the study.

Children were examined and investigated. SGOT and SGPT levels were tested at the time of admission and the ratio of SGOT and SGPT was taken. Signs and symptoms were monitored and classified into dengue fever, dengue with warning signs or severe dengue. SGOT/SGPT ratio was compared with the progression of disease, duration of the hospital stays and the severity of illness such as dengue fever without warning signs, dengue fever with warning signs or severe dengue.

Statistical analysis

Data thus obtained was compiled using MS Excel for windows and analyzed using SPSS for Windows v.20 (Statistical Package for the Social Sciences). Results were expressed in the form of descriptive statistics like percentage and frequency and analyzed using inferential statistics like Chi square test. A $p<0.05$ was considered as being of significance for all statistical tests

RESULTS

A total of 100 cases admitted to the General hospital, SIMS and RC, Bangalore, Karnataka, India from July 2020 to June 2021 were statistically analyzed. Based on the age, majority were in the age group of 3-6 years (28%) followed by 6-9 years (20%) age group, among gender males were more common (56%). Mean age of the study population was 7.59 years

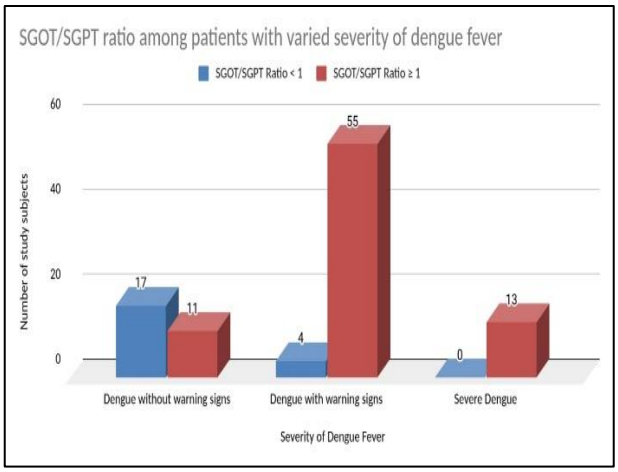

Figure 1: Comparison of SGOT/SGPT ratio among patients with varied severity of dengue fever.

All the patients included in the study, were febrile at the time of admission, 40% were sick looking. Other associated symptoms were vomiting (66%), rashes (23%), headache (21%), pain abdomen (36%), convulsion (3%) and myalgia (35%). 5% of the total patients had bleeding manifestations. Majority had symptoms such as fever, vomiting and myalgia irrespective of the severity of the illness. Patients with dengue with warning signs and severe dengue appeared as sick looking and majority of them presented with abdominal pain along with fever and vomiting.

At the time of admission SGOT/SGPT ratios among 21 patients were <1, among whom 17 had dengue without

warning signs with an average duration of stay of around 72 hours. Among 100 patients SGOT/SGPT ratio was >1 in 79 patients and the progression of dengue severity was assessed based on signs and symptoms of severe dengue. Among those 79, 13 patients progressed to severe dengue, 55 had dengue fever with warning signs with the average duration of stay being 5-7 days and required close monitoring. The difference in distribution of SGOT/SGPT ratio across various severity of dengue fever was found to be statistically significant (p<0.0001) (Table 1 and Figure 1).

Table 1: Comparison of SGOT/SGPT ratio among patients with varied severity of dengue fever.

SGOT/SGPT ratio	Dengue without warning signs	Dengue with warning signs	Severe dengue	Total	P value
< 1	17	4	0	21	<0.0001
≥ 1	11	55	13	79	

DISCUSSION

In present study, out of 100 children who were included 56% were male and 44% were female, which is comparable with other studies. Like Athira et al and Jakribettu et al were 59% and 69.5% male respectively.[6,7]

All the patients included in this study were febrile at the time of admission similar to other studies like Jakribettu et al and Jain et al.[7,8] In our study, vomiting was present in 76.2% of patients with dengue with warning signs and 53.8% of patients with severe dengue which was identical to other studies likes Saraswathy et al and Bhave et al have reported vomiting in 50-79% of cases of dengue fever and dengue haemorrhagic fever.[9,10] The 44% patients in this study had abdominal pain in dengue with warning signs and 46.1% in severe dengue compared to Surangrat et al which showed that abdominal pain was present in 61.2% cases with DHF and 66.7% cases in DSS.[11] Bokade et al observed abdominal pain in 25% of cases in dengue warning signs 70% of severe dengue.[12]

Dhrubajyoti et al has revealed that the liver enzymes were elevated, SGOT 84.6% and 100% of DHF and DSS cases respectively and SGPT was raised in 92% of DHF and 96% of DSS cases.[14] Tamil Selvan et al has mentioned that mean AST level is 299 in severe dengue group and 252 in dengue with warning signs group. Mean ALT level was 313 in Severe dengue group and 124 in Dengue with warning signs group.[15]

In our study the ratio of SGOT/SGPT was high in 93.2% of patients with dengue with warning signs group and 100% of patients with severe dengue. SGOT/SGPT values have been found to be higher for severe forms of dengue than for uncomplicated dengue fever. There is possible association between increased transaminase levels with increasing disease severity.

As study conducted by Zubair et al assessment of dengue fever severity through liver function test, suggested that reversal of SGOT/SGPT ratio is helpful in differentiating severe dengue from other viral infections. Initial assessment of SGOT/SGPT ratio can be used as an early predictor to assess dengue severity and also help to counsel the parents.[13]

CONCLUSION

In this study, at the time of admission children with SGOT/SGPT ratio <1 had lesser duration of hospital stay and no complication when compared to ratio >1. Thus SGOT/SGPT ratio at the time of admission has been use to predict dengue severity, prolonged hospital stays and outcome.

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REFERENCES

1. Peter G, Micheal DR. Principles of Drug Therapy., Behrman K, Stanton J, editors. Nelson Text Book of Paediatrics. 21st edition vol 1. Philadelphia: Saunders Elsevier. 2016;1760-64.
2. Parthasarthy A, Menon PSN, Nair MKC. IAP Text Book of Paediatrics. 7th edition. Immunity, Immunisation and Infectious Diseases. 2019;310-34.
3. Waggoner JJ, Gresh L, Vargas MJ, Ballesteros G, Tellez Y, Soda KJ et al. Viremia and clinical presentation in Nicaraguan patients infected with Zika virus, chikungunya virus, and dengue virus. Clin Infect Dis. 2016;30:ciw589.
4. World Health Organization, Special Programme for Research, Training in Tropical Diseases, World Health Organization. Department of Control of Neglected Tropical Diseases, World Health Organization. Epidemic, Pandemic Alert. Dengue: guidelines for diagnosis, treatment, prevention and control. Available at: https://apps.who.int/iris/handle/10665/44188. Accessed on 14 March 2022.
5. Gajera VV, Sahu S, Dhar R. Study of haematological profile of dengue fever and its clinical implication. Ann Applied Bio-Sci. 2016;3(3):A241-6.
6. Athira PP, Jagan OA, Umadevi P, Pragnatha K, Veena PM. A Retrospective Study of Paediatric Dengue Cases in a Tertiary Care Hospital in Southern India. J Clin Diagnostic Res. 2018;12(7).
7. PaiJakribettu R, Boloor R, Thaliath A, George SY, George T, Rai MP et al. Correlation of clinic-

haematological parameters in paediatric dengue: a retrospective study. J Trop Med. 2015;24:2015.
8. Jain H. Clinical profile and outcome of dengue fever in hospitalized children of South Rajasthan, India. Int J Contemp Pediatr. 2016;3(2):546-9.
9. Saraswathy MP, Sankari K, Sakthi G, Sripriya D, Lakshmi P. Incidence of dengue hemorrhagic fever in children: a report from Melmaruvathur Tamil Nadu, India. J Pharm SciInnov. 2013;2(1):34-6.
10. Bhave S, Rajput C, Bhave S. Clinical profile and outcome of dengue fever and dengue haemorrhagic fever in paediatric age group with special reference to WHO guidelines (2012) on fluid management of dengue fever. Int J Adv Res. 2015;3(4):196-201.
11. Pongpan S, Wisitwong A, Tawichasri C, Patumanond J. Prognostic indicators for dengue infection severity. Int J Clin Pediatr. 2013;2(1):12-8.
12. Bokade CM, Chauhan U, Kamat P. Study of Hepatic Dysfunction In Dengue Fever And It's Predictor of Outcome. Int J Recent Sci Res. 2016;7(9):13360-63.
13. Zubair A, Qureshi AA, Jafri SA. Assessment of Dengue Fever Severity Through Liver Function Test. In Dengue-Immunopathology and Control Strategies. 2017;26.
14. Bandyopadhyay D, Chattaraj S, Hajra A, Mukhopadhyay S, Ganesan V. A study on spectrum of hepatobiliary dysfunctions and pattern of liver involvement in dengue infection. J Clin Diagnostic Res. 2016;10(5):OC21.
15. Selvan T. Study of prevalence and Hepatic dysfunction in Dengue fever in children. Liver. 2015; 9(11):14-8.

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