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Study of Dengue Fever, its Clinical Profile And Cardiac Involvement Among Paediatric Population

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Abstract: *Arboviruses such as Dengue virus represent a serious public health concern in tropical and subtropical regions of the world. The epidemics inendemic countries are occurring more frequently with increasing magnitude.Cardiac involvement is a known but infrequent feature of dengue. Medical literature has reports of isolated cases of atrioventricular conduction disorders (junctional rhythm and atrioventricular block), supraventricular arrhythmias, and myocarditis. This present study analyses myocardialinvolvement in clinically and serologically confirmed cases of dengue infection.The results and follow-up of this study revealed that myocardial involvement of dengue infections run a benign course without long-term complications. The shock syndrome in severe dengue infections is most likely to be due to hypovolaemia and internal fluid extravasation. Dengue myocarditis was exclusively asymptomatic with no long-term sequelae. Two-dimensional echocardiography was the only reliable tool of investigation. Early diagnosis, strict monitoring and prompt supportive management reduces the mortality rate in dengue.*

I. Manuscript

Introduction *:*

Arboviruses such as Dengue virus represent a serious public health concern in tropical and subtropical regions of the world. The epidemics inendemic countries are occurring more frequently with increasing magnitude.[1] Early recognition and prompt initiation of appropriate treatment arevital if disease related morbidity and mortality are to be limited. Serological confirmation of serum IgG and IgM are diagnostic of Dengue. The most severe forms of the disease are dengue shock syndrome and dengue hemorrhagic fever. The shock syndrome is due to an important alteration in capillary permeability and significant capillary leakage of plasma into extra-vascular spaces, and isassociated with immune activation and high serum levels of tumor necrosis factor-a (TNF) receptor, interleukin (IL)-8, and other factors.[2] Cardiac involvement is a known but infrequent feature of dengue. Medical literature has reports of isolated cases of atrioventricular conduction disorders (junctional rhythm and atrioventricular block), supraventricular arrhythmias, and myocarditis. On the other hand, the ventricular dysfunction associated with the acute phase of dengue hemorrhagic fever has been described by several authors and is probably under diagnosed in clinical practice.[3] Cardiac dysfunction may complicate management of hypotension in Dengue Shock Syndrome. Recentepidemics of the disease led us to design this present study to look at myocardialinvolvement in clinically and serologically confirmed cases of dengue infection.

Methodology :

All the children admitted with clinical features suggestive of Dengue and who were diagnosed serologically with IgM and IgG levels during 2009-2011 were included in the study. A total of 200 patients were included in the study. Cases that tested positive for dengue IgMantibodies were classified into dengue fever, dengue hemorrhagic fever anddengue shock syndrome as per WHO criteria.Other laboratory investigations included hemoglobin, total and differentialcount, hematocrit, PT, APTT, liver transaminases, renal function tests, chest X ray,ecg and 2D echo, cardiac enzymes were done. All the children with a previous history of any type of cardiac illness, mixed infection, admission E.C.G. suggestive of any cardiac morbidity or on medications affecting the heart rate were excluded from the study.

II. Results

Mean age of the group was 5.8 years (range 3-12) with 55% of them being females and 45% males. Average stay in hospital was 6.8 days. Of the 100 dengue seropositive cases 29% cases are dengue shock syndrome, 16% are dengue hemorrhagic fever and 55% are dengue fever. Figure 1 depicts the symptomatology percentage in the affected population of the study group. Heart findings included s3 gallop in 2% of the cases (n=4) which on 2d echo were found to have myocarditis with right ventricular ejection fraction low in one case while the other had low left ventricular ejection fraction. One case was found to have mild TR on routine 2d echocardiographic examination. 10% of the cases had bradycardia at initial presentation. The 2D echo findings

returned to normal after 2-3 weeks(on routine follow up). One case that had myocarditis went into CCF. 3 patients had echocardiographic abnormalities in the form of myocarditis, with right ventricular dysfunction, the other had myocarditis with CCF and the third had mild TR. ECG findings showed non specific ST and T wave changes in 12% of the cases with no significant 2D echo abnormalities. Hepatomegaly was seen in 95% patients and 3% patients had splenomegaly. 16% patients had ascites. Laboratory investigations revealed thrombocytopenia in 99% patients, elevated SGPT in 15% patients, elevated SGOT in 12% patients, elevated APTT in 54% patients and elevated PT in 54% patients. 40%patients had hemoconcentration, one patient had leucopenia and 14% patients had leucocyte count above 11,000.

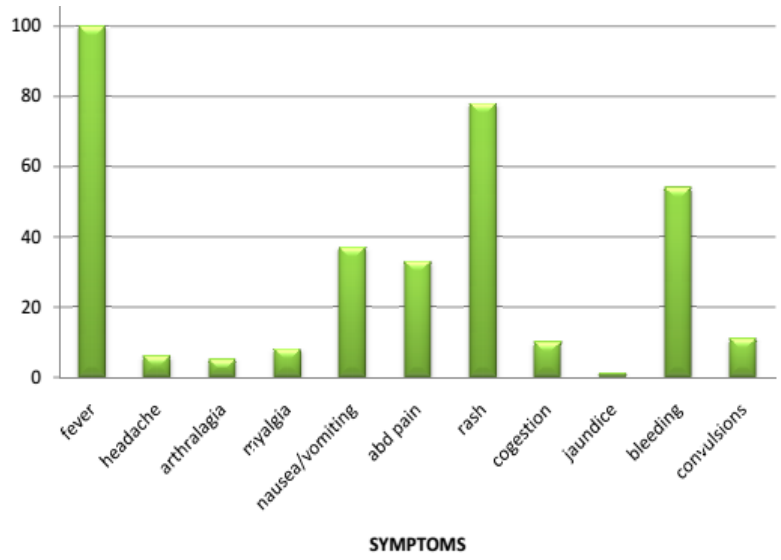

Fig 1 : Percentage of population having the symptomatology.

Most patients recovered from an average duration of 8.3 days and one patient died from myocarditis , CCF. The prevalence of myocarditis is 3% with 95 confidence interval of 0.19% to 5.81%, this was calculated for a sample of 200 with ecg changes 4% were abnormal with 95 confidence interval of 0.78% to 7.22%.

III. Discussion

Dengue infection, from being a sporadic illness, has now become a regular post-monsoon. Involvement of children and increase in the frequency of the epidemic are indicators of higher incidence of this infection. In the present study, the average age of presentation was 5.16 years, which suggests that the endemicity of dengue fever is on the rise. Fever, hypotension, vomiting, abdominal pain, hepatomegaly, thrombocytopenia, erythematous rash, bleeding manifestations in the form of malena, deranged aPTT and PT were the common clinical and laboratory features. Of the 100 dengue seropositive cases 29% cases are dengue shock syndrome, 16% are dengue hemorrhagic fever and 55% are dengue fever. Since this was a hospital-based study, it does not reflect the burden of the community infection of dengue that may just have no symptoms or undifferentiated fever. Thus, we had higher number of patients with DSS and DHF rather than the ones with undifferentiated fever. The community infection of DF is characterized by the 'iceberg' or 'pyramid' phenomenon. At the base most of the cases are symptomless, followed in increasing rarity by DHF and DSS. Thus, one can postulate from the study that since most of our patients had DHF and DSS, and being the tip of the iceberg, the base formed by undifferentiated fever may be very high, and thus the endemicity of dengue in the community would be quite high.

Fever was seen in 100% of patients infected though it was found that patients with milder disease (DF and dengue hepatitis) had longer duration of fever as compared to patients with severe dengue (DHF and DSS) who had shorter duration of fever, suggestive of the fact that secondary infection may lead to a more fulminant course due to antibody-dependent enhancement and that repeat infection may be more dangerous. With this increasing endemicity of dengue and rise in the prevalence of dengue in children, it is only a matter of time that dengue will become a major public health problem. ECG findings showed non specific ST and T wave changes in 12% of the cases with no significant 2d echo abnormalities. 3 patients had echocardiographic abnormalities in the form of myocarditis, with right ventricular dysfunction, the other died had myocarditis with CCF and the third had mild TR. More recent prospective studies on Dengue fever manifestations have reported varied incidence of abnormal cardiac findings from approximately 15–27% for myocarditis [4,5,6] and up to 40% for functional abnormalities[7]. Cardiac performance and hemodynamic status are affected by intravascular volume,

cardiac functions and autonomic response. The present study show that cardiac functional abnormalities are common in dengue and correlate with disease severity. However, these abnormalities were transient, did not require specific treatment, and were not accompanied by evidence of structural damage to the myocardium.

IV. Conclusion

Dengue infections are now well-established. The prevailing climatic conditions, environmental pollution, rapid urbanization, over-crowding of cities and careless human practices are proving conducive for the rapid breeding of the mosquito vector and the spread of this infection.The results and follow-up of this study revealed that myocardial involvement of dengue infections run a benign course without long-term complications. The shock syndrome in severe dengue infections is most likely to be due to hypovolaemia and internal fluid extravasation. Dengue myocarditis was exclusively asymptomatic with no long-term sequelae. Two-dimensional echocardiography was the only reliable tool of investigation. Early diagnosis, strict monitoring and prompt supportive management reduces the mortality rate in dengue.

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