Study of Lipid Profile and Liver Function Test as Potential Markers with Severity of Dengue Fever

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Abstract:

Dengue fever (DF) is normally a self-restricting mosquito-borne viral illness. It is brought about by one of the 4 subtypes of the dengue infection. It is a solitary positive abandoned RNA infection. The essential dengue infection was gotten from fighters who turned out to be sick in Calcutta, New Guinea, and Hawaii. Trademark highlights are fever and insignificant protected indications, the inclination to stun and drain, or dengue stun disorder/dengue hemorrhagic fever (DSS/DHF). Preceding the historical backdrop of the Jin Dynasty of Dengue, it was in the past known as a water poison suspected to be spread by the blowing of air. The target here is to correspond biochemical changes in lipid profile and liver capacity tests with seriousness in dengue disease. The technique we have embraced for our examination is done on patients experiencing dengue fever who were conceded for over year and a half at Krishna Hospital and Medical Research Center, Karad. According to WHO, there are 390 million Dengue infections per annum, of which 96 million manifests clinically with severe disease. **Result** Majority of the patients were diagnosed as Dengue Fever (54.4%), followed by Dengue Haemorrhagic Fever (37.8%) and Dengue Shock Syndrome (7.8%). There were 42 patients (46.7%) with ALT less than 50 and 31 patients (34.4%) with AST less than 50. There were 19 patients (21.1%) with ALT 50 to 150 and 25 patients (27.8%) with AST 50 to 150. The study **concludes** that Dengue viral fever is one of the common viral infection requiring hospitalization. The clinical features of Dengue fever can widely vary from mild fever, minimal constitutional symptoms to features like severe bleeding tendencies, shock, acute respiratory distress syndrome (ARDS) and even death.

Introduction:-

Dengue fever (DF) is generally a self-restricting mosquito-borne viral infection. Brought about by one of the 4 subtypes of the dengue infection. It is a solitary positive-abandoned RNA infection. It is an individual from the family Flaviviridae, sort Flaviviridae communicated by mosquitoes with yellow fever and Asian tiger mosquitoes. Trademark highlights are fever and insignificant sacred indications for quake and draining inclination or dengue stun condition/dengue hemorrhagic fever (DSS/DHF). Throughout the entire existence of the Jin Dynasty of Dengue, First Dengue is thought to spread as a flying bug. "Dengue" in Flying creepy crawly 1 is of African beginning, 2,3,4, and is gotten from Swahili KA-DINGA PEPO which implies seizure-like fits. Dengue was first depicted by Benjamin Rush during a scourge in Philadelphia in 1780 and the term was begat from BREAK BONE FEVER.5..[6]

Epidemiology:

The dengue infection species has a place with the flaviviruses and the family Flaviviridae. This low (50 nM) infection exemplifies single-abandoned RNA as a genome..[7,8] The infection has four serotypes named DEN-1, DEN-2, DEN-3, DEN-4..[7,8,9] .Significant hereditary variety exists inside phylogenetically unmistakable "subtypes" or "genotypes" inside each serotype. Presently, three subtypes are regularly recognized for DENV-1, six for DENV-2 (one of which is found in non-human primates), four for DENV-3, and one for DENV-4. 4, select to non-human primates for other DENV-4. The 10 essential dengue infections were gotten from warriors who turned out to be sick in Calcutta, New Guinea, and Hawaii. It happens in three unique cycles: The Enzootic cycle, a crude arrangement made by the monkey-Aedes-monkey cycle, is found in South Asia and Africa where the infection isn't pathogenic to monkeys and every one of the 4 serotypes is disengaged from monkeys.[7,11]

The epizootic cycle, the dengue infection got over by non-human primate, called connect vectors, was first recognized in Sri Lanka during 1986–1987, from a human pandemic, among the macaques of force, which Has been demonstrated by serological examinations..[7]

Plague cycle, this is kept up through human-Aedes - the human cycle in scourge/intermittent pandemics. All serotypes bring about hyperandomicity. By and large, Aedes aegypti have little tendency for oral contamination by the dengue infection, however, this truly solid liking towards

the human host (anthropophilic), various taking care of senses, and exceptionally homegrown environment make it a competent vector.

Aim:

To assess the effect of Dengue fever on liver capacity.

Methods:

This was a cross-sectional and observational examination. This investigation was carried on patients determined to have Dengue fever who were conceded to Krishna clinic and clinical Research place, Karad directed over a time of year and a half. Moral freedom from the school and college board of trustees was taken. After moral leeway, authorization was taken from the head of divisions (Protocol number: 0250/2018-2019). As indicated by WHO Fact Sheet dated thirteenth September 2018.[4] There are 390 million dengue contaminations each year, of which 96 million show intensely extreme illness. Hence, the current predominance of dengue-tainted cases is 24.6%.

So, p = 24.6% So p = 0.246; q = (1-0.246) =0.754; taking absolute error of 10% e= 0.1

Using formula for sample size (n) calculation, $n = \dfrac{4 \times p \times q}{e^2} = 75$

A total 75 patients were enrolled for present cross sectional and observational study.

The patients fulfilling the selection criteria were briefed about the nature of study and included in the study after obtaining a written and informed consent from the participant. Patients fulfilling selection criteria were selected for study. Patients were interviewed to obtain the demographic characteristics such as age and gender, presenting complaints, diagnosed with Dengue viral fever. These patients were subjected to clinical examination and their findings including vitals and systemic examination were noted. These findings were recorded on a predesigned and pretested proforma. Liver functions tests :Liver functions tests were done in the serum sample collected on day of admission by automated (Transasai v2 analyser). Total bilirubin, serum albumin, alkaline phosphatase was estimated by calorimetric assay. AST and ALT was estimated by international federation of clinical chemistry without pyridoxal phosphate activation.

Results:

The mean age was 31.39 ± 11.65 years. The most common age group was 21- 30 years (41.1%), followed by 31 - 40 years (20%), < 20 years (17.8%), 41 - 50 years (12.2%), 51 - 60 years (8.9%).There were 50 males (55.6%) and 40 females (44.4%) with male: female ratio of 1.25:1. Male patients was slightly more affected than female patients. Majority of the patients were diagnosed as Dengue Fever (54.4%), followed by Dengue Haemorrhagic Fever (37.8%) and Dengue Shock Syndrome (7.8%). Out of total 40 females, 27 had Dengue fever (67.5%), 9 had Dengue hemorrhagic fever (22.5%) and 4 had dengue stun condition (10%). Of the 50 men, 22 had dengue fever (44%), 25 had dengue hemorrhagic fever (half) and 3 had dengue stun disorder (6%). Our study observed more cases of dengue hemorrhagic fever in men than women. A significant difference was observed between sex and severity of dengue ($X2 = 7.16$, df = 2, p = 0.028). On evaluating patients based on LFT, raised ALT was present in 74.4% patients, raised AST was present in 84.4%, total bilirubin was raised in 15.6% and decreased serum albumin was present in 56.7% patients. There were 42 patients (46.7%) with ALT less than 50 and 31 patients (34.4%) with AST less than 50. There were 19 patients (21.1%) with ALT 50 to 150 and 25 patients (27.8%) with AST 50 to 150. There were 21 patients (23.3%) with ALT 150 to 250 and 13 patients with AST 150 to 250 (14.4%). There were 8 patients (8.9%) with ALT more than 250 and 21 patients (23.3%). with AST more than 250. Mean ALT of the participants was 106.73 ± 94.24; mean AST was 142.58 ± 129.31; mean total Bilirubin was 0.92 ± 0.41; mean Sr. Albumin was 3.38 ± 0.48; mean total cholesterol was 128.61 ± 30.05; mean triglycerides were 107.30 ± 23.70; mean LDL cholesterol was 83.44 ± 23.64 and mean HDL was 33.61 ± 8.99.

Significant association was seen between the liver function tests and severity of Dengue (p<0.05). Out of total cases of Dengue fever, 53.1 % had ALT raised , 71.4% had raised AST , 22.4 % decreased had serum albumin . Out of cases of Dengue haemorrhagic fever, all had raised ALT and raised AST (100%), 8 had raised total bilirubin (23.5%), 97.1% of cases had decreased serum Albumin .Out of 7 cases of Dengue shock syndrome, all of them had raised total Bilirubin ALT, AST, and reduced Albumin . Negative correlation was seen between the platelet count and ALT levels, suggesting that when the platelet count decreases, ALT levels increase in patients. Negative correlation was seen between the platelet count and AST levels, suggesting that when the platelet count decreases, AST levels increase in patients. In this study, 67 patients had

decreased LDL cholesterol (74.4%), 40 patients had decreased HDL cholesterol (44.4%), 35 had decreased TG (38.9%) and 26 cases had decreased total cholesterol (28.9%).

Significant association was seen between the lipids and severity of Dengue (p<0.05). Out of cases of Dengue fever, 10.2% had decreased total cholesterol , 22.4%, cases had decreased triglycerides , 10 cases had decreased LDL (20.4%) and 55.1%). had decreased HDL . Out of total cases with Dengue Haemorrhagic Fever, 41.2%, had decreased total cholesterol , 50% cases had decreased triglycerides , 67.6% of cases had decreased LDL (67.6%) and 97.1% had decreased HDL (97.1%). All cases of Dengue shock syndrome had decreased total cholesterol, triglycerides decreased, LDL and HDL decreased.   Significant difference was seen between the mean values of ALT, AST, total bilirubin, serum albumin, total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides in Dengue severity groups. (all p<0.001).Increased aspartate aminotransferase (AST), alanine aminotransferase (ALT), bilirubin levels and decreased levels of serum albumin, total cholesterol, high density lipoprotein cholesterol (HDL), low density lipoprotein cholesterol(LDL), triglycerides levels indicate towards a more severe infection- Dengue haemorrhagic fever and Dengue shock syndrome.

Discussion:

Dengue fever is a major recurring public health problem especially in South- East Asia the spectrum of Dengue fever (DF) ranges from mild febrile illness to Dengue haemorrhagic fever (DHF) and Dengue shock syndrome (DSS).[12] Biochemical alterations have shown to be early predictors of DF.[13,14] This study was conducted on 90 patients diagnosed with Dengue fever to study the impact of Dengue fever on liver function and lipid profile and correlate the findings with the severity of the disease.

Lipid Profile:

In the present study, Lipid profile of the patients showed that, 74.4% patients had decreased HDL cholesterol, 38.9% had decreased TG and 28.9% had decreased total cholesterol. The mean total cholesterol in DF, DHF and DSS was 144.02 ± 25.05, 114.11 ± 25.55 and 91.14 ± 3.62, respectively. The mean triglycerides was114.77 ± 25.12, 101.76 ± 18.46 and 81.85 ± 4.22, respectively. The mean LDL cholesterol in DF, DHF and DSS was 94.04 ± 20.49, 73.61 ± 21.65, 57.00 ± 8.30, respectively. The mean HDL was 37.91± 8.78, 29.50 ± 6.03, 23.42 ±3.40,

respectively. Significant association was seen between the changes in lipid profile and severity of Dengue disease (P <0.05). A huge contrast was seen between the mean upsides of absolute cholesterol, LDL cholesterol, HDL cholesterol, and fatty oils in the dengue seriousness gatherings (all p <0.001).

Santhosh et al [15], reported mean total cholesterol in DF, DHF and DSS as 189± 17.16, 140.95 ± 15.9 and 91.86 ± 23; mean TG in DF, DHF and DSS as 132± 47, 171 ± 70 and 255 ± 57; mean LDL cholesterol in DF, DHF and DSS as 119 ± 12.94, 74.84 ± 19.9 and 42.29 ± 17.44; and mean HDL cholesterol in DF,DHF and DSS as 40 ± 10, 37 ± 7 and 36 ± 15. Alterations in the lipid profile reflected the severity of the fever (p<0.05). Villar-Centeno et al[16] , reported negative association between TG levels and severity of Dengue infection. Durán A et al[17], reported lipid profile alterations in patients with severe form of Dengue, total cholesterol was decreased in all forms of Dengue and LDL was decreased significantly in severe Dengue, triglycerides were increased in severe cases . Biswas et al[18] and Osuna-Ramos et al[19] reported that total cholesterol and LDL, HDL were lower in patients with Dengue and more so in patients with severe Dengue (p<0.001).

Conclusion:

Dengue viral fever is one of the common viral infection requiring hospitalization. The clinical features of Dengue fever can widely vary from mild fever, minimal constitutional symptoms to features like severe bleeding tendencies, shock, acute respiratory distress syndrome (ARDS) and even death. In the present study conducted to analyse the impact of Dengue infection on liver function tests and fasting lipid profile, it was found that during Dengue fever, biochemical alterations in the form of increased aspartate aminotransferase (AST), alanine aminotransferase (ALT), bilirubin levels and decreased levels of serum albumin, total cholesterol, high density lipoprotein cholesterol (HDL), low density lipoprotein cholesterol(LDL), triglycerides levels indicate towards a more severe infection-Dengue haemorrhagic fever and Dengue shock syndrome . These parameters of severe Dengue infection can thus help in early triaging of patients of Dengue infection and there by aid in better management.

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