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A CROSS-SECTIONAL COMPARATIVE RESEARCH ON THE DIFFERENCE OF DENGUE FEVER (DF) AND DENGUE HEMORRHAGIC FEVER (DHF) WITH ITS SEVERITY GRADES (DHF I, II, III & IV)

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Abstract:
Objectives: *Our research aimed at the determination of the difference between dengue hemorrhagic fever (DHF) and dengue fever (DF) total cholesterol (TC) including adverse DHF III & IV and favorable DHF I & II outcomes.*
Methodology: *Our research was a cross-sectional comparative study which was carried out from July – November, 2017 in the Medicine Department of Services Hospital, Lahore. The sample of the research was one hundred febrile cases diagnosed with positive serology of dengue. We measured every case for TC on the first day of admission. Clinical outcomes of DHF and DF were also measured. Classification was made as DHF cases were divided into favorable and adverse groups respectively I, II and II, IV on the basis of their outcomes.*
Results: *Male to female proportion was respectively 64 & 36 with a mean age and TC respectively as (33.03 ± 14.5) years and (3.02 ± 0.88) mmol/L. Mean age of the 63 DF cases and 37 DHF cases were respectively (30.21 ± 12.7) & (37.84 ± 16.21) with a significant P-value as ((0.017) and values of mean TC for both respectively as (3.43 ± 0.79) & (2.34 ± 0.56) mmol/L with a significant P-value as (0.000). Male to female proportion in DF was two to one and in DHF cases it was 1.47 to one (p = 0.001). In the total 37 DHF cases the further subdivision was as that DHF I, II, III and IV cases were respectively 16, 8, 10 and 3cases. Mean TC for DHF I (2.77 ± 0.45), DHF II (2.16 ± 0.33), DHF III (2.05 ± 0.35) and DHF IV (1.49 ± 0.35) mmol/L. Respective favorable and adverse outcomes of the mean TC were level were (2.55 ± 0.5) & (1.92 ± 0.42) mmol/l with significant P-value as (0.000).*
Conclusion: *There is a strong correlation of low TC serum with the severity of the disease in the patients of dengue fever.*

Key Words: *Dengue Hemorrhagic Fever (DHF), Dengue Fever (DF) and Total Cholesterol (TC).*

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INTRODUCTION:

DF is an infection caused by the bite of mosquito in the tropical regions (geographical disease) results in the shape of very common dengue virus [1, 2]. There is an annual report of dengue cases for DF and DHF respectively 100 million and 25 – 50 million as reported by WHO; whereas, Pakistan is also a victim of this virus from 2006 [3, 4]. Older age is under threat including children by DF [5]. According to WHO classification there are four categories of DF including an undifferentiated febrile illness, dengue hemorrhagic fever (DHF), dengue fever (DF) and an expanded dengue syndrome with common incidence of DF and DHF [6, 7]. According to severity DHF has further sub-divisions such as severe and mild with respective grades as I, II and III, IV. Multiple syndromes can be involved in the incidence of dengue virus as reported by WHO [6, 7]. There is threat to the lives of affected cases by expanded dengue syndrome when presented with hepatic failure, acute renal failure, acute pancreatitis, acute respiratory distress syndrome, myocarditis and spontaneous splenic rupture [6, 7].

Diagnosis can be made through numerous laboratory investigations including hematological and biochemical tests (total leucocyte count, hematocrit and platelet count) and (liver transaminases) respectively [6, 7]. Less used assessment tools also include serum total cholesterol, serum albumin, serum electrolytes (calcium and sodium), serum creatinine, blood urea nitrogen, coagulation and arterial blood gases studies [6, 7].

Cholesterol has a highly established relation with the biological decorations as studies by numerous studies [8]. It is water insoluble and available in the blood in the shape of lipoproteins which can be measured and it includes chylomicrons, very low-density lipoproteins, low density lipoproteins and high-density lipoproteins [9]. Health can be determined through cholesterol low and raised levels which is also a focus of risk factor of hypercholesterolemia (primary or secondary) for atherosclerosis; hypocholesterolemia is condition which is unusual used in case of fifth percentile low level of TC serum in the race, gender and age adjustments [10]. Its primary causes include abetalipoproteinemia and familial hypobetalipoproteinemia; whereas, secondary causes include hyperthyroidism, malabsorption, chronic liver disease, malignancy, critical illness, sepsis, intense diet, adrenal insufficiency, primitive life style etc. [10]. Lipid decreasing drugs may induce the level of cholesterol [11].

There is a link of decreased cholesterol with mortality, malignancies, depression, hemorrhagic stroke and aortic dissection; elder patients may also face mortality [12, 13]. Moreover, in the critical cases oxidative stress and altered cytokine levels are increased [14]. Low mean TC serum was reported in the critical trauma cases by Dunham [15]. Combs also reported same in the patients of burns and Wilson in the injured and critically ill cases [16, 17]. Lipid level enhancement experiments have been done for bacterial LPS effects blockage [18, 19]. DHF cases have been observed with low levels of lipid [20, 21]. DHF advancing grades are also linked with the level of TC serum [22]. We aimed at the determination of the difference between dengue hemorrhagic fever (DHF) and dengue fever (DF) total cholesterol (TC) including adverse DHF III & IV and favorable DHF I & II outcomes.

METHODOLOGY:

Our research was a cross-sectional comparative study which was carried out from July – November, 2017 in the Medicine Department of Services Hospital, Lahore. The sample of the research was one hundred febrile cases diagnosed with positive serology of dengue. We measured every case for TC on the first day of admission. Clinical outcomes of DHF and DF were also measured. Classification was made as DHF cases were divided into favorable and adverse groups respectively I, II and II, IV on the basis of their outcomes. No discrimination of gender was considered and patients were short listed in the age bracket of 15 – 60 years. We did not include the patients with diabetes mellitus (DM), ischemic heart disease, hypertension, dyslipidemia, cerebrovascular accidents, liver disease, renal failure, malignancy, hematologic disorders and thyroid disorder and BMI above 35 were also excluded.

Consent was secured before the start of research and initial hospitalization was made in the Ward if Dengue Infection. We documented clinical outcomes and demographic profile. On the first day samples of venous blood were taken and standard treatment was extended to every patient. Follow-up was carried out in all the categories of DF and DHF. Special proforma was used for the documentation of every information and data. SPSS was used for data analysis; quantitative and qualitative variables were presented in the research outcomes. Chi Square test and T-test was also employed to compare the outcomes of DHF and DF groups. Statistical significant P-value was observed as (< 0.05). Grades comparison was also made on the categories of favorable and adverse DHF grades P-value (< 0.05).

RESULTS:

Male to female proportion was respectively 64 & 36 with a mean age and TC respectively as (33.03 ± 14.5) years and (3.02 ± 0.88) mmol/L. Mean age of the 63 DF cases and 37 DHF cases were respectively (30.21 ± 12.7) & (37.84 ± 16.21) with a significant P-value as ((0.017) and values of mean TC for both respectively as (3.43 ± 0.79) & (2.34 ± 0.56) mmol/L with a significant P-value as (0.000). Male to female proportion in DF was two to one and in DHF cases it was 1.47 to one (p = 0.001). In the total 37 DHF cases the further subdivision was as that DHF I, II, III and IV cases were respectively 16, 8, 10 and 3cases. Mean TC for DHF I (2.77 ± 0.45), DHF II (2.16 ± 0.33), DHF III (2.05 ± 0.35) and DHF IV (1.49 ± 0.35) mmol/L. Respective favorable and adverse outcomes of the mean TC were level were (2.55 ± 0.5) & (1.92 ± 0.42) mmol/l with significant P-value as (0.000). Detailed outcomes have been shown in Table I, II and III with respective figures mentioned against each tabulated data.

Table – I: Disease Severity and Mean Total Cholesterol

Clinical Outcome	Number (Total = 100)	Total Cholesterol in mmol/L	
		Mean	(±) SD
DF	63	3.43	0.79
DHF	37	2.34	0.56
DHF – I	16	2.77	0.45
DHF – II	8	2.16	0.33
DHF – III	10	2.05	0.35
DHF – IV	3	1.49	0.35

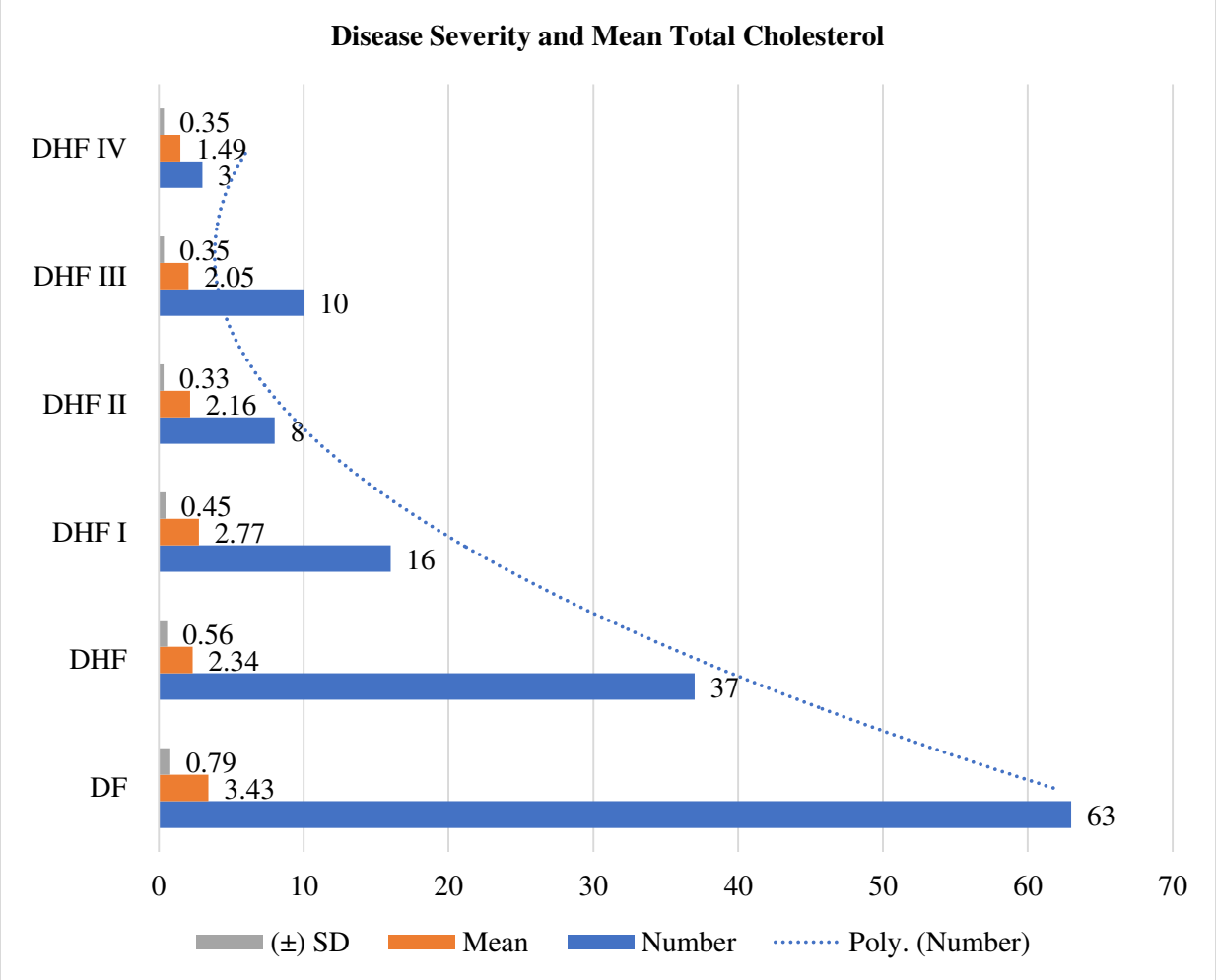


Table – II: Comparison of DF and DHF

Parameter	Mean Age (Years)		Ratio		Mean Total Cholesterol (mmol/L)	
	Mean	(±) SD	Male	Female	Mean	(±) SD
DF (63)	30.21	12.7	2.00	1.00	3.43	0.79
DHF (37)	37.84	16.21	1.47	1.00	2.34	0.56
P-Value	0.017		0.000		0.000	

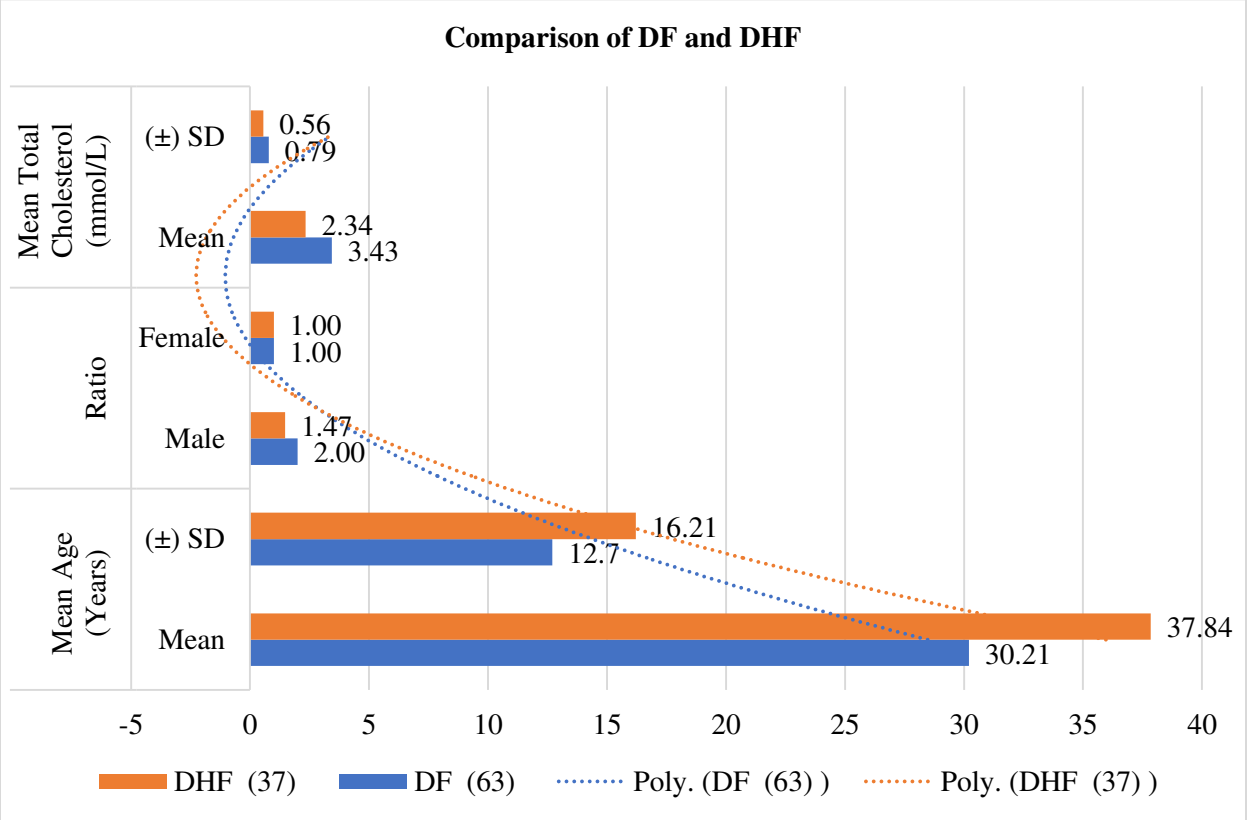
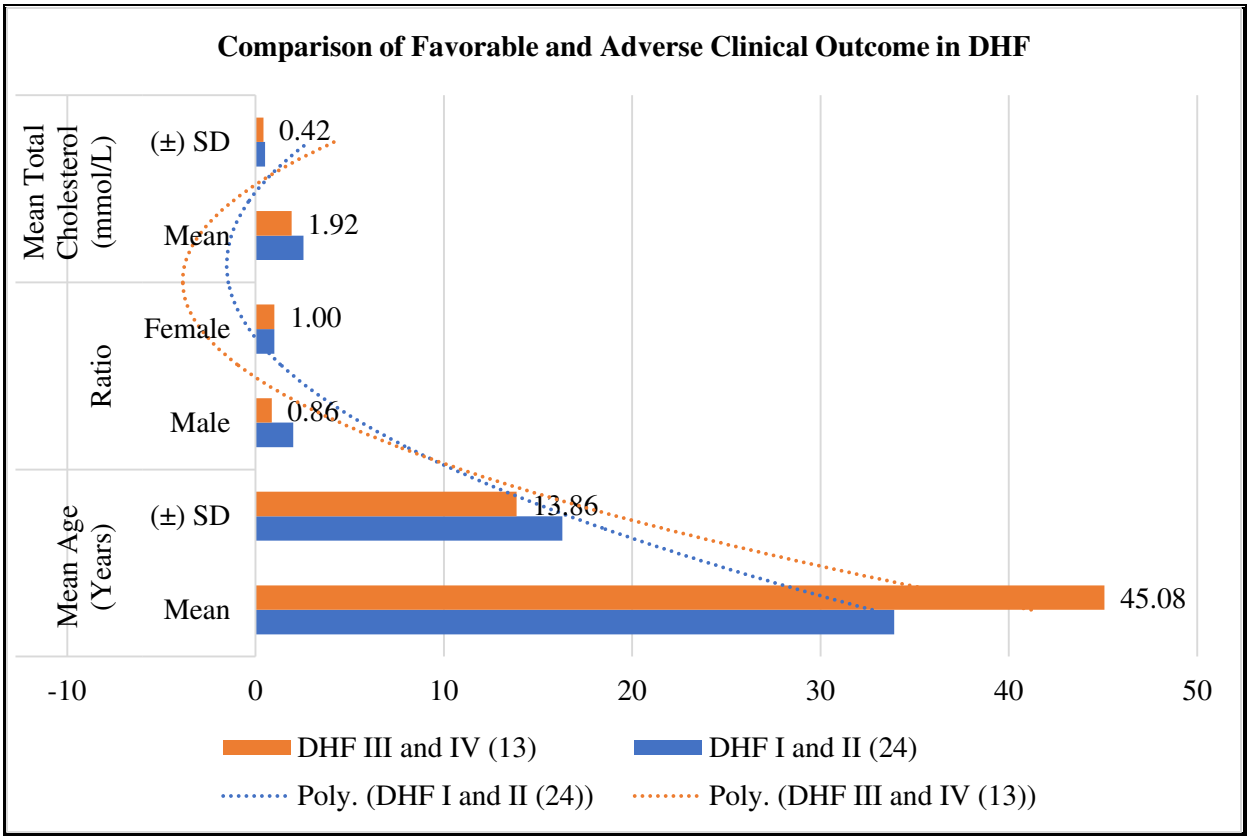


Table – III: Comparison of Favorable and Adverse Clinical Outcome in DHF

Parameter	Mean Age (Years)		Ratio		Mean Total Cholesterol (mmol/L)	
	Mean	(±) SD	Male	Female	Mean	(±) SD
DHF I and II (24)	33.92	16.29	2.00	1.00	2.55	0.5
DHF III and IV (13)	45.08	13.86	0.86	1.00	1.92	0.42
P-Value	0.036		0.79		0.000	



DISCUSSION:

Young adults are the primary affected cases of dengue infection with a mean age (33.03 ± 14.4) years. Whereas, the mean age for DF (30.21 ± 12.7) years and DHF (37.84 ± 16.21) years with a significant P-value (0.017) which is similar as observed in other research studies held in Pakistan. According to Riaz and Mahboob the mean age was reported respectively as (31 ± 12.9) years and (31.5 ± 15.2) years [24, 25]. Hakim is of the view that DHF and DF was prevalent in the age group of (20 – 45) years [26].

Villar observed same gender distribution as it has been reported in our research (M: F = 1.78:1) [20]. Whereas, Suvarna observed male to female proportion as (2.3:1.21). According to Goh back in 1987 the proportion was observed as (1.9:1) [27]. Higher incidence was reported in the research carried out in Singapore about dengue epidemic as (324.7 for 100,000) males and (272 per 100,000) females [28]. Similar results have been observed in research studies held in Indian background [29, 30].

TC serum was notices at the time of hospitalization. There was a significant variation in the mean values of DHF and DF (P-value 0.000). There was a steady decrease in the patients of DHF in the levels of TC with the advancement of grades which declined for DHF-I from (2.77 ± 0.45) mmol/L to DHF-IV (1.49 ± 0.35) mmol/L. Regression for further explained by the favorable and adverse grades outcomes. For both groups mean TC level was observed as (2.55 ± 0.5) mmol/L & (1.92 ± 0.42) mmol/L with significant P-value as (0.000). Kalayanarooj reported same levels of TC for DHF and SF cases respectively for DF as 4.35 mmol/L, DHF Grade-I 2.82 mmol/L, Grade-II 2.11 mmol/L, Grade-III 2.13 mmol/L and Grade-IV 0.85 mmol/L wit plasma leakage cut off value as 2.57 mmol/L [22]. According to Suvarna mean TC value for DF was (3.64 ± 1.2 mmol/L) and for DHF as (2.41 ± 0.66) mmol/L with and without shock [21]. Low cholesterol level was also associated with hepatic dysfunction and thrombocytopenia [21]. There was another proposal of high level of cholesterol with immune system interaction [21].

Similar outcomes were proposed by Van Gorp about total cholesterol in the DHF cases with shock (2.35 mmol/L) and without shock (3.1 mmol/L) [23].

CONCLUSION:

There is a strong correlation of low TC serum with the severity of the disease in the patients of dengue fever.

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