A CROSS-SECTIONAL OBSERVATIONAL STUDY ON THE RELATION BETWEEN PROTEINURIA(PU) AND DENGUE FEVER (DF).

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ABSTRACT

Multiple studies have shown that DF is a vector-borne virus that affects world health. Recent studies show that severe DF is the top cause of pediatric and adult hospitalizations. Early diagnosis and treatment are essential to avoiding complications. Even though various studies have shown interest in microalbuminuria in severe DF, there is little data on urine protein excretion during infection. In order to determine the relationship between DF severity and proteinuria, we conducted a study. Our study found proteinuria with DHF and DSS compared to DF alone, with increased FS, LM-BP, and hospital stay ratios. Thus, we conclude that proteinuria in DF patients must be detected as soon as possible in order to determine its severity and avoid dengue-related renal complications.

Keywords: DF**,** Proteinuria**,** Hospital Stay Ratios**,** Treatment, Severity ,DHF and DSS**.**

INTRODUCTION

Many past studies have shown that , DF is a vector borne viral disease therefore it is a major public health threat globally. It is caused by Dengue virus of Flaviviridae family in tropical & subtropical regions.[1] Currently, studies have also thrown light that, severe dengue is one of the leading causes of hospitalisation problem among many children & adults.[2] A study mentioned that, 390 million DF infections yearly recorded 95% credible interval 284–528 million, out of which 96 million were present clinically (with any severity of disease), & another study finds that about 3.9 billion people are at its risk.[3] Hence, There is a worldwide resurgence of dengue fever as a result of population increases, dengue fever, and a lack of effective mosquito control tactics. The treatment of these complications and subsequent outcome prediction are critical at an early age.[4] Furthermore, studies have shown that presence of microalbuminuria has a potential risk predictor for severe DF, but there is little information on the magnitude, timing of onset or evolution of urinary protein excretion during infection.[5] Hence, the aim of our study was to evaluate & determine the link between proteinuria & severity of DF.

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AIM

The goal of our study was to evaluate & determine the link between proteinuria & severity of DF.

INCLUSION CRITERIA

1. All patients with DF were included in the study.
2. Patient of greater than 18 years of age were included in the study.
3. Both male & female genders were included in the study.
4. Patient with Dengue NS1 Antigen and/or Dengue IgM Antibody positive status were included .

EXCLUSION CRITERIA

1. Patients with h/o known or newly detected comorbidities like DM, High BP, KD,HD, ND or endocrinopathies, or other documented concomitant infections like Malaria, Chikungunya, Leptospirosis, H1N1 or TB.
2. Patient with pregnancy diagnosed ,UTI , trauma patients,any type of malignancy, long term oral or injectable drugs & who had fever of more than 2 weeks duration.
3. Patients less than 18 years of age, and who did not give consent for the study.

MATERIAL & METHOD

STUDY DESIGN-Our study was an hospital based cross-sectional observational type of study.

SAMPLE SIZE- For our study we have included around 75 DF patients.

STUDY SETTING- Our study was done at Department of Medicine, KH , Karad, Maharastra.

INFORMED CONSENT- We have obtained a written informed consent from all our study included patients as per ICMR rule.

STUDY DURATION- Our study was conducted for around 18 months. We have started our investigation from 1st October 2018 & ended in 31st March, 2020.

SAMPLING TECHNIQUE- We have used simple random sampling for our study.

STUDY POPULATION- Patients of both male & female were admitted to Krishna Hospital, tested positive for dengue NS1 antigen and/or dengue IgM, and were then included in the study.With the use of the modified Kuppuswamy scale, the socioeconomic level of the patients was determined.[6]

EDUCATION OF THE HEAD OF THE FAMILY	SCORE
Professional degree	7
Graduate or postgraduate	6
Intermediate or post high school diploma	5
High school certificate	4
Middle school certificate	3

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Primary school certificate	2
Illiterate	1
OCCUPATION OF THE HEAD OF THE FAMILY	
Professional (white collar)	10
Semi-professional	6
Clerical, shop-owner/farm	5
Skilled worker	4
Semi-skilled worker	3
Unskilled worker	2
Unemployed	1

TABLE 1: MODIFIED KUPPUSWAMY SCALE.[6]

MONTHLY INCOME IN FAMILY		
In 2001 (Base Year)	In 2017 (January 2017 CPI)	**SCORE**
≥15,197	≥41,430	12
7,595-15,196	20,715-41,429	10
5,694-7,594	15,536-20,714	6
3,793-5,693	10,357-15,535	4
2,273-3,792	6,214-10,356	3
761-2,272	2,092-6,213	2
≤760	≤2,091	1

TABLE 2 : MONTHLY INCOME .

SOCIOECONOMIC STATUS	TOTAL SCORE
Upper Class	26-29
Upper Middle Class	16-25
Lower Middle Class	11-15
Upper Lower Class	05-10
Lower Class	01-04

TABLE 3: SOCIOECONOMIC STATUS.

STUDY PROCEDURE- The patients' daily symptoms were meticulously recorded, including retroorbital headache, joint pain, cough, myalgia, joint pain, nausea, vomiting,

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stomach pain, diarrhea, and constipation. Vital indicators were continuously checked during their hospital stay. Patients' temperatures were taken using mercury thermometers four times each day and anytime they complained of a fever, and records were maintained to determine the frequency of fever spikes, the highest ratio recorded throughout the hospital stay & the duration of the hospital stay. Using sphygmomanometers, blood pressure was manually recorded twice daily in conventional wards and every two hours in ICUs. Records were kept to determine the lowest systolic and diastolic BP recorded throughout the hospital stay. At each of their twice-daily evaluations, we searched for rashes, petechiae, ecchymoses, gum bleeding, epistaxis, hematemesis, malena, hematuria, edema, and altered sensorium. Once daily, a tourniquet test was conducted. The Hematology Unit of the Department of Pathology used a 'Nihon Kohden' Automated 3 Part Cells Counter (Model Number MEK6510) to estimate patients' complete blood counts throughout their hospital stays.

FIGURE 1: AUTOMATED CELL COUNTER.

We have used urine protein estimation at bedside by the dipstick method, using "SIEMENS Combistix SG" reagent strips for urinalysis. Further, the readings on a dipstick showed 'Nil' proteinuria as absent and readings of 'Trace', '+1', '+2," and '+3' as present.

FIGURE 2: DIPSTICK PU TEST.

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For correlation, the corresponding estimates of urine protein were considered as per following table:-

Dipstick Protein reading	Protein excretion gm/24 hours	Protein excretion mg/dL
Negative	<0.1	<10
Trace	0.1–0.2	15
1+	0.2–0.5	30
2+	0.5–1.5	100
3+	2.0–5.0	300
4+	>5.0	>1000

TABLE 4: DIPSTICK PROTEIN ANALYSIS.

This Diagnosis of Dengue was done on the basis of RDT kits of "J. Mitra & Co. Pvt. Ltd" available in Virology Unit of the Department of Microbiology.

FIGURE 3: DENGUE RAPID DIAGNOSTIC TEST KIT (RDT).

STASTICAL ANALYSIS

Using a semi-structured, test-driven questionnaire, data was collected. The collected information was input into Excel. Frequencies and percentages, as well as charts and graphs, have been used to depict the data. Quantitative variables' means and standard deviations have been shown. All necessary statistical tests have been performed using IBM SPSS software (Trial Version 21) and Microsoft Office 2013. PU has been correlated with other measures of dengue infection severity, such as those found in clinical and laboratory tests, using Pearson's correlation coefficient. "Correlation coefficient (r)" stood for the degree of correlation. The Chi-square test for association and the Student t-test for contrast have been utilized. The significance level for the 'p' value was set at less than 0.05.

RESULT

AGE

AGE GROUP (YR)	NUMBER OF SUBJECTS	PERCENTAGE
<20	13	17.3%
21 to 30	27	36.0%
31 to 40	9	12.0%

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41 to 50	10	13.3%
51to 60	9	12.0%
61 to 70	7	9.3%
Total	75	100.0%
X^2 = 21.72, DF = 5, 'p' <0.001		

TABLE 5: AGE DISTRIBUTION.

In our study we have found that ,the most common age group was between 21 to 30 years with 27 patients upto 36.0% which was followed by less than 20 years with 13 patients upto 17.3% and 41 to 50 years with 10 patients upto 13.3% respectively.

GENDER

GENDER	NUMBER OF SUBJECTS	PERCENTAGE
Female	46	61.3%
Male	29	38.7%
Total	75	100.0%
Female: Male ratio = 1.58: 1		
X^2 = 3.85, DF = 1, 'p' = 0.049		

TABLE 6: GENDER DISTRIBUTION.

In our study we have found that, 46 females with 61.3% and 29 males with 38.7% were included in our study with female to male ratio upto 1.58: 1.

SOCIOECONOMIC STATUS

SOCIOECONOMIC CLASS	NUMBER OF SUBJECTS	PERCENTAGE
Lower Class	3	4.0%
Upper Lower Class	5	6.7%
Lower Middle Class	37	49.3%
Upper Middle Class	22	29.3%
Upper Class	8	10.7%
Total	75	100.0%
X^2 = 55.06, DF = 4, 'p' <0.001		

TABLE 7: SOCIOECONOMIC STATUS.

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In our study we have found that , majority of the patients were from lower middle class with 37 in number upto 49.3%, followed by upper middle class with 22 patients upto 29.3% respectively.

DIETARY HABITS

DIET	NUMBER OF SUBJECTS	PERCENTAGE
Mixed Diet	59	78.7%
Vegetarian	16	21.3%
Total	75	100.0%
X^2 = 24.65, DF = 1, 'p' <0.001		

TABLE 8: DIETARY HABITS.

In our study we have found that , majority of patients showed mixed diet with 59 patients upto 78.7% followed by rest 16 patients who were vegetarian upto 21.3% respectively.

RELIGION

RELIGION	NUMBER OF SUBJECTS	PERCENTAGE
Hindu	69	92.0%
Muslim	4	5.3%
Christian	2	2.7%
Total	75	100.0%
X^2 = 116.24, DF = 2, 'p' <0.001		

TABLE 9 : RELIGION.

In our study we have found that , 69 patients were hindu by religion upto 92% followed by 4 muslim patients upto 5.3% and 2 were Christians upto 2.7% respectively.

OCCUPATION

OCCUPATION	NUMBER OF SUBJECTS	PERCENTAGE
Farmer	7	9.3%
House Wife	24	32.0%
Student	17	22.7%
Health Care Worker	10	13.3%
Others	17	22.7%
Total	75	100.0%

TABLE 10: OCCUPATION.

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In our study we have found that, 24 patients were housewives upto 32%, 17 patients were students upto 22.7%, 10 were health care workers & remaining 7 Farmers were 9.3% respectively.

DIAGNOSIS

DENGUE SEVERITY	NUMBER OF SUBJECTS	PERCENTAGE
DF	64	85.3%
DHF	6	8.0%
DSS	5	6.7%
Total	75	100.0%
X^2 = 91.28, DF = 2, 'p' <0.001		

TABLE 11: DIAGNOSIS.

In our study we have found that , 64 patients were upto 85.3% suffering with DF, 6 patients with DHF upto 8% and 5 patients with DSS upto 6.7% respectively.

PU

PU		NUMBER OF SUBJECTS	PERCENTAGE	PERCENTAGE
Absent	Nil	29	38.7%	38.7%
Present	Trace	21	28.0%	61.3%
	+1	18	24.0%	
	+2	5	6.6%	
	+3	2	2.7%	
	Total Positive	46		
Total		75	100.0%	100.0%
X^2 = 34.0, DF = 4, 'p' <0.001				

TABLE 12: PU.

In our study we have found that , 29 patients showed no proteinuria upto 38.7%, followed by 21 patients upto 22.7% which showed 'trace' proteinuria, further 18 patients upto 24% showed '+1' proteinuria, 5 patients upto 6.6% showed '+2' proteinuria & remaining 3 patients upto 2.7% showed '+3' proteinuria respectively.

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PU & AGE

PROTEINURIA	NUMBER OF SUBJECTS	MEAN AGE IN YEARS	STD. DEVIATION	'P' VALUE
Present	46	33.89	16.75	0.33
Absent	29	37.62	15.12	
Total	75			

TABLE 13: PU& AGE.

In our study we have found that, there was no significant difference was seen between mean age of patients with & without proteinuria ('p' >0.05) respectively.

PU & GENDER

GENDER	PU		
	Absent	Present	Total
Male	10	19	29
Female	19	27	46
Total	29	46	75
Chi square test: X^2 =0.34 'p' = 0.554, DF = 1			

TABLE 14: PU & GENDER.

In our study we have found that , there was no significant association between presence of proteinuria and gender.

PU & CP OF DISEASE SEVERITY

Clinical Parameters (CP)	PU	Number of Subjects	Mean	Std. Deviation	'p' Value- t test
Duration of Hospital Stay (DHS) (Days)	Absent	29	4.48	2.91	0.014
	Present	46	6.71	2.71	
Duration of Fever (Days) (DOF)	Absent	29	4.72	3.14	0.567
	Present	46	4.37	2.18	
Highest number of daily fever spikes	Absent	29	1.62	0.94	0.034
	Present	46	2.19	1.22	
Highest Temperature Recorded(HTR)	Absent	29	100.27	1.46	0.016
	Present	46	101.18	1.60	

Systolic BP - Lowest recorded (mmHg)	Absent	29	103.10	15.37	0.024
	Present	46	95.47	13.81	
Diastolic BP - Lowest recorded (mmHg)	Absent	29	66.13	15.01	0.036
	Present	46	59.56	16.59	

TABLE 15: PU & CP.

In our study we have found that, significant difference was seen between proteinuria and durations of hospital stay , highest number of daily fever spikes, highest temperatures recorded & lowest Blood Pressures respectively 'p' < 0.05.

CORRELATION OF PU & CP OF DISEASE SEVERITY

PU		Parameters	Correlation(r)	'p' value
Dipstick	(mg/dl)	Platelet Count	-.268[*]	.020
		DHS (Days)	.006	.962
Nil	<10	DOF (Days)	.027	.816
Trace	15			
+1	30	Highest number of daily fever spikes	.230[*]	.047
+2	100			
+3	300			
		HTR	.272[*]	.018
		SBP-LR (mmHg)	-.278[*]	.016
		DBP -LR (mmHg)	-.302[**]	.008
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

TABLE 16: CORRELATION BETWEEN 2 VARIABLES.

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DIAGNOSIS & CP OF DISEASE SEVERITY

Clinical Parameters	Diagnosis	Number of Subjects	Mean	Std. Deviation	'p' Value
Duration of Hospital Stay (Days)	DF	64	5.50	2.64	
	DHF	6	8.33	3.38	
	DSS	5	10.52	4.25	0.017
Duration of Fever (Days)	DF	64	4.40	2.59	
	DHF	6	4.50	3.33	
	DSS	5	5.20	2.56	0.934
Highest number of daily fever spikes	DF	64	1.85	1.05	
	DHF	6	2.00	1.09	
	DSS	5	2.40	1.26	0.756
Highest Temperature Recorded	DF	64	100.61	1.39	
	DHF	6	100.66	1.86	
	DSS	5	101.05	1.45	0.892
Systolic BP - Lowest recorded (mmHg)	DF	64	102.18	14.19	
	DHF	6	96.66	8.16	
	DSS	5	82.14	16.52	0.024
Diastolic BP - Lowest recorded (mmHg)	DF	64	64.21	14.23	
	DHF	6	67.00	7.87	
	DSS	5	58.07	13.25	0.013

TABLE 17: DIAGNOSIS & CP OF DISEASE SEVERITY.

In our study we have found that , mean duration of hospital stay was significantly more in DSS upto 10.52 ± 4.25 days as compared to DHF upto 8.33 ± 3.38 days & Dengue Fever upto 5.50 ± 2.64 days .Hence, we found no stastical significant difference at p = 0.017. Further, mean duration of fever in DSS was 5.20 ± 2.56 days, for DHF it was 4.50 ± 3.33 days & DF it was 4.40 ± 2.59 days. Hence, we found no statistical significant difference at p=0.934. In addition, MLSBP record was significantly less in DSS 82.14 ± 16.52 mmHg as compared to DHF 96.66 ± 8.16 mmHg & DF it was 102.18 ± 14.19 mmHg at p=0.024 respectively and MLDBP record was significantly less in DSS upto 58.07 ± 13.25 mmHg as compared to DHF upto 67.0 ± 7.87 mmHg & DF upto 64.21 ± 14.23mmHg at p=0.013 respectively.

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PU & A/S OF DENGUE

Alarming Symptoms (A/S)	PU			Chi Square Test, Df = 1	Odds Ratio and Confidence Interval at 95% Confidence Limit
	Absent (29)	Present (46)	Total (75)		
Pain in abdomen	8	25	33	$X^2 = 4.13$, p = 0.032, Significant	OR = 3.12, CI = 1.42 – 8.57
Vomiting	11	26	37	$X^2 = 2.46$, p = 0.11, Not Significant	OR = 2.13, CI = 0.95 – 8.22
Nausea	13	34	47	$X^2 = 6.43$, p = 0.011, Significant	OR = 3.45, CI = 1.41 – 9.77
Headache	27	44	71	$X^2 = 0.23$, p = 0.63, Not Significant	OR = 1.64, CI = 0.58 – 5.62
Myalgia	27	44	71	$X^2 = 0.23$, p = 0.63, Not Significant	OR = 1.64, CI = 0.58 – 5.62
Joint Pain	16	36	52	$X^2 = 4.76$, p = 0.035, Significant	OR = 2.94, CI = 0.12 – 8.94
Edema	5	21	26	$X^2 = 7.87$, p = 0.026, Significant	OR = 4.0, CI = 1.08 – 11.76
Retro Orbital Pain	18	34	52	$X^2 = 0.298$, p = 0.86, Not Significant	OR = 1.72, CI = 0.21 – 7.57
Altered Sensorium	1	7	8	$X^2 = 48.16$, p =<.001, Significant	OR = 5.03, CI = 1.58 – 13.18

TABLE 18: PU & A/S.

In our study we have found that, there was a stastical significant difference seen in occurrence of pain in abdomen, nausea, joint pain, edema & altered sensorium in DF with and without proteinuria at p<0.05. Out of 29 without PU, only 8 showed pain in abdomen

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upto 27.6%,5 had edema upto17.2% & 1 had altered sensorium upto 3.4% respectively. Out of 46 patients of PU, 25 showed pain in abdomen upto 54.3%,13 had showed nausea upto 44.8%, 34 showed nausea upto 73.9% ,16 had joint pain upto 55.2% ,36 had joint pain upto 78.3% , 21 had edema upto 45.7% & 7 had altered sensorium upto 15.2% respectively.

PU & BLEEDING MANIFESTATION

Signs	PU			Chi Square Test, Df = 1	Odds Ratio and Confidence Interval at 95% Confidence Limit
	Absent (29)	Present (46)	Total (75)		
Rashes	8	24	32	$X^2 = 5.39$, p = 0.026, Significant	OR = 2.86, CI = 1.05 − 7.78
Patechiae	3	12	15	$X^2 = 8.65$, p < 0.001, Significant	OR = 3.06, CI = 0.78 − 11.97
Ecchymosis	2	6	8	$X^2 = 12.21$, p < 0.001, Significant	OR =2.03, CI = 0.38 − 10.79
Malaena	1	7	8	$X^2 = 23.46$, p < 0.001, Significant	OR = 5.03, CI = 1.58 − 13.18
Hematuria	2	6	8	$X^2 = 12.21$, p < 0.001, Significant	OR =2.03, CI = 0.38 − 10.79
Epistaxis	1	6	7	$X^2 = 21.41$, p < 0.001, Significant	OR = 4.2, CI = 0.48 − 36.84
Hematemesis	2	5	7	$X^2 = 14.28$, p = 0.014, Significant	OR = 1.65, CI = 0.3 − 9.1
Gum Bleeds	6	6	12	$X^2 = 1.07$, p = 0.53, Not Significant	OR = 0.57, CI = 0.17 − 1.99
Positive Tourniquet Test	4	9	13	$X^2 = 12.67$, p = 0.011, Significant	OR = 1.54, CI = 0.43 − 5.59

TABLE 19: SYMPTOMS IN 2 VARIABLES.

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In our study we found that , stastically significant difference was seen in regards to presence of rashes, petechiae, ecchymosis, malena, hematuria, epistaxis, hematemesis and positive tourniquet test between DF patients with and without proteinuria at $p < 0.05$.

PU & DIAGNOSIS

Dipstick PU	Diagnosis			Total
	DF	DHF	DSS	
Nil	28	1	0	29
Trace	21	0	0	21
+	13	3	2	18
++	2	1	2	5
+++	0	1	1	2
Total	64	6	5	75

TABLE 20: PU& DIAGNOSIS.

In our study we found that, there was stastically significant difference in dipstick PU among patients of DF, DHF and DSS at $p < 0.001$. Out of 64 patients of DF, 28 showed no urine albumin upto 43.8%, 21 had trace upto 32.8%, 13 had +1 upto 20.3% and 2 had +2 (3.1%). Out of 6 patients of DHF, 1 had no urine albumin upto 16.7%, 3 had +1 upto 50%, 1 patient each had +2 upto 16.7% and +3 upto 16.7% . Out of 5 patients of DSS, 2 had +1 upto 40%, 2 had +2 upto 40% and 1 had +3 upto 20% respectively.

CORRELATION BETWEEN PU & DENGUE SEVERITY(DS)

Correlation between DS and 24 hours UrineProtein		24 hours UrineProtein
DF - 0,	Pearson Correlation	.605[**]
DHF, DSS – 1	Sig. (2-tailed)	.000
	N	75
** Correlation is significant at the 0.01 level (2-tailed).		

TABLE 21: CORRELATION BETWEEN 2 VARIABLES.

In our study we have found that , stastically significant correlation was present between severe DF (DHF & DSS) & 24hr protein ($p < 0.001$).

PU & BLOOD COUNTS (BC)

CBC Parameters	PU	Number of Subjects	Mean	Std. Deviation	'p' Value – t test
CBC - Hb	Absent	29	11.75	2.63	

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	Present	46	12.84	2.12	0.057
CBC TLC	Absent	29	5803.44	4160.02	0.012
	Present	46	4276.08	3902.62	
CBC Platelets	Absent	29	126931.04	72245.57	0.037
	Present	46	90543.47	72383.14	

TABLE 22: CORRELATION.

In our study we have found that , stastically significant difference was seen in TLC & platelet count between patients with & without proteinuria. Mean TLC & PC both were significantly lower in patients with proteinuria p<0.05.

CORRELATION B/W PU & PC

Correlation between PU and PC		PC
Urine protein	Pearson Correlation	-0.329**
	Sig. (2-tailed)	0.004
	N	75
** Correlation is significant		

TABLE 23 : CORRELATION B/W 2 VARIABLES.

In our study we have found that, stastically significant negative correlation was seen between PU &PC (r = -0.329, 'p' = 0.004).

CORRELATION OF DF SEVERITY & PC WITH PU

Parameters vs PU	Correlation coefficient R	P Value
Severity of Dengue (DHF/DSS)	0.605	<0.001
Platelets	-0.309	0.007

TABLE 24 : CORRELATION WITH 2 VARIABLE.

PU & RDT

RDT Result	PU			Chi Square Test, DF = 1
	Absent (29)	Present (46)	Total (75)	
NS1 Positive	20	36	56	$X^2 = 0.81$, 'p' = 0.367, Not Significant

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IgM Positive	15	21	36	$X^2 = 0.26$, 'p' = 0.308, Not Significant

TABLE 25: PU&RDT.

In our study we have found that, no statically significant difference was seen in presence of PU between Dengue NS1 Antigen positive and Dengue IgM antibody positive patients ('p' > 0.05).

PU & OUTCOME

PU	Outcome		Total
	Death	Discharged	
Nil	0	29	29
Trace	1	20	21
+	2	16	18
++	3	2	5
+++	2	0	2
Total	8	67	75
Percentage	10.6%	89.4%	100.0%

TABLE 26: PU & OUTCOME.

In our study we found that, stastically significant association between dipstick PU levels and outcome of the patients ('p' < 0.001). All 29 cases with no PU were discharged (100%). There was 1 (4.8%) death out of 21 cases with trace PU. There were 2 (11.1%) deaths out of 18 patients with +1 PU. There were 3 (60%) deaths out of 5 patients with +2 PU. Both patients (100%) with +3 PU had died.

DIAGNOSIS & OUTCOME

Outcome	Diagnosis			Total
	DF	DHF	DSS	
Death	1	3	4	8
Discharge	63	3	1	67
Total	64	6	5	75

TABLE 27 : DIAGNOSIS & OUTCOME.

In our study we have found that , there was stastically significant difference of outcome among patients of DF, DHF and DSS ('p' < 0.001) Out of 64 cases of DF, there was only one death upto 1.6%. Out of 6 patients of DHF, there were 3 deaths upto 50%. Out of 5 patients of DSS there were 4 deaths upto 80% respectively.

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PREDICTIVE VALUE OF DIPSTICK PU IN SEVERE DF

Dipstick PU	Severe Dengue (DHF/DSS)		Total
	Present	Absent	
Present	10	36	46
Absent	1	28	29
Total	11	64	75
Odds ratio: 9.9, Yates corrected X2 = 3.405, DF=1, 'p'= 0.065, No significant association			

TABLE 28 : DIPSTICK PU IN SEVERE DF.

In our study we have found that, the positive predictive value of Dipstick PU in Severe DF is calculated as : 10/46, that is 0.217. This implies that 21.7 % of patients with positive PU on Dipstick test will actually have Severe DF. The negative predictive value of Dipstick PU test in Severe DF is calculated as : 28/29, that is 0.965 This implies that 96.5 % of patients with no PU on Dipstick test will actually not have Severe DF.

DISCUSSION

In the current study, the mean DHS was significantly higher in DSS (10.52 4.25 days) than in DHF (8.33 3.38 days) and DF (5.50 2.64 days). (p=0.017). The mean DHS for DF was 3.8 days in the study by Faiz Ahmed Raza et al. DHF significantly increased morbidity (8.83 fever days) and inpatient duration (4.9 days).[7] The average length of stay for dengue cases in the hospital was 11.65 days, according to Hemant Kumar et al.'s clinico-demographic profile of dengue cases.[8] The mean daily fever in DSS was 5.20 2.56 days, in DHF it was 4.50 3.33 days, and in DF it was 4.40 2.59 days. No statistically significant change was found (p = 0.934). In comparison to DHF (96.66 8.16 mmHg) & DF (102.18 14.19 mmHg), the MLSBPR in DSS was significantly lower, at 82.14 16.52 mmHg. (p=0.024) When compared to DHF (67.0 7.87 mmHg) and DF (64.21 14.23 mmHg), the MLDBPR in DSS (58.07 13.25 mmHg) was significantly lower (p = 0.013).

In this study, abdominal pain, nausea, joint pain, edema, and altered sensorium varied significantly between DF patients with and without PU. (p<0.05) The mean DHS, the number of fever spikes, the HT, the recorded BP, and the incidence of PU all varied significantly. (p > 0.05). The presentations of patients with DSS, DHF & DF differed significantly in terms of abdominal pain, vomiting, edema, and altered sensorium. (p<0.05).M PU predictive value for DHF development was studied by Farhad F. Vasanwala et al. They found that the cut-off value of UPCR being equal to or more than 20 mg/mmol resulted in significantly higher peak levels of proteinuria in DHF patients (85%) than in DF patients (61%).[9] PU and hypoalbuminemia are thought to be caused by the NS1 antigen of the dengue virus attaching to the heparan sulfate molecule of the glycocalyx, altering its filtration ratio.[10] The severity of dengue had no effect on the mean hemoglobin values (p = 0.40). With 51.85% of patients showing anemia, Banerjee et al. observed similar findings.[11]

Dengue fever cases had a mean TLC of 5035.93, DHF 4133.33 & DSS 3852.62. TLC and platelets showed a statistically significant difference in dengue severity (p 0.05). TLC and PC

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were found to be statistically significant predictors of PU (p 0.05). TLC & PC were significantly lower in patients with PU. PU and the presence of NS1 and IGM-positive tests did not correlate significantly. (P > 0.05) In this study, DF cases had mean platelets of 117281.25, DHF patients 48333.33 & DSS patients 30425.04. The majority of DF patients had platelets of more than 1 lakh in 34 patients upto 53.1% and between 50,000 and 1 lakh in 20 upto 31.3%. Out of 6 DHF patients, 2 upto 33.3% had platelets in the 50,000–1 lakh, 20,000–50,000 & less than 20,000 ranges. Three DSS patients upto 60% had platelets below 20,000, whereas two upto 40% had platelets between 20,000 and 50,000. Dengue severity and platelets were statistically significant ($p < 0.001$).

Thrombocytopenia, coagulopathy, and vasculopathy are common in severe dengue. DIC is caused by a clotting-fibrinolysis imbalance. Some patients with severe or prolonged shock may have more significant anomalies, which, when combined with hypoxia, acidosis, and significant thrombocytopenia, significantly predict D.I.C. and excessive bleeding.[12] 90.6% of DF cases had no RBCs in their urine, 3.1% had 0–1 RBCs, 1.6% had 3-5 RBCs, and 1.6% had numerous RBCs, according to the study. One patient of DHF upto 16.7%, one of occasional fever upto 16.7%, two patients of 0–1 RBCs upto 33.3%, one of 2-3 RBCs upto 16.7% & one of 3–7 RBCs upto 16.7%. There were two patients of DSS upto 40% each with 3–7 RBCs, one patients upto 20% with occasional RBCs, and numerous additional cases. Hemant Kumar studied clinico-demographic profile of dengue cases observed outcome of these cases was good, with only 04 patients 0.52% resulting in fatality.[13]

The study reveals that inadequate early recognition and monitoring of severe forms may lead to statistically significant morbidity and mortality. In the absence of medical intervention, the fatality rate for individuals diagnosed with DHF or DSS may reach 40–50%. In addition, prompt identification of disease, diligent observation, and suitable administration of fluids have resulted in a mortality rate reduction of 1%. Furthermore, in the event that shock is detected concomitant with a decline in pulse pressure and subsequent administration of intravenous fluids, a favorable outcome can be expected. Most patients will feel better within 48 hours and fully recover within a week. If the patient experiences cold extremities, the prognosis may be unfavorable. The primary causes of mortality in cases of DHF/DSS are attributed to extended periods of shock, excessive hemorrhaging, fluid saturation, and the onset of acute liver failure accompanied by encephalopathy. The present study reports a case series in which the leading factors that contributed to mortality were identified as disseminated intravascular coagulation, acute respiratory distress syndrome, liver failure, refractory shock, and neurological manifestations, either individually or in combination. The results indicate a notable correlation between the levels of urine albumin and the outcomes of patients (p 0.001).

CONCLUSION

Studies have proved already that, DF is one of the deadliest infectious disease prevalent in developing countries like India. Therefore, this makes more important to evaluate as early as possible to avoid its severity & possible complications. In our study we have found that , presence of proteinuria in urine was linked with DHF & DSS when compared to DF alone. Further, it was also associated with longer duration of hospital stay, more frequent FS and LM-BP. But its increase was negatively correlated with platelet count. Thus, we concludes

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that it is important to look for proteinuria in DF patients at the earliest for detecting its severity & avoid any further complications related to renal involvement in Dengue.

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