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TO STUDY THE CORRELATION OF SERUM VITAMIN D LEVEL WITH DISEASE SEVERITY IN DENGUE PATIENTS

General Medicine

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ABSTRACT

Background: Dengue fever, a contagious viral illness affecting 390 million people annually, presents mild to severe symptoms and requires hospital care, emergency management, and home care. **Objective:** To estimate serum Vitamin D levels in dengue fever patients and investigate the correlation between Vitamin D3 levels and disease severity. **Methods:** A study involving 200 patients aged over 15 years at S.R.N. Hospital, Motilal Nehru Medical College, Prayagraj, to predict dengue illness severity by comparing blood Vitamin D levels to the condition's severity. Data collection involves monitoring serum Vitamin D levels every two days, and the study protocol includes laboratory investigations like blood tests, creatinine, LFT, electrolytes, and NS-1 Antigen. **Results:** The DSS group has a male-to-female ratio of 81.25%, while the DF group has a male-to-female ratio of 69.07% and a female-to-female ratio of 30.93%. Dengue Shock Syndrome patients have a higher mean Vitamin D3 level of 17.31 ng/mL compared to those with Dengue Fever and Dengue Hemorrhagic Syndrome, and a control group has a mean Vitamin D3 level of 10.84 ng/mL. Results show that DSS patients stay longer, require more blood transfusions, and have higher NS1 positives. Mixed diet is more common in DF and DHF, suggesting a link between dengue severity and diet. DSS patients have higher vitamin D3 levels, and they usually require intensive therapy for shock fluid imbalance and organ failure which prolongs hospitalization indicating severe systemic involvement. **Conclusion:** The study reveals differences in clinical presentation, treatment requirements, and outcomes between Dengue Shock Syndrome (DSS), Dengue Deficiency (DF), and Dengue Hemorrhagic Syndrome (DHF) patients. Platelet transfusions are crucial for managing severe dengue, and early recognition and intensive treatment are essential. Nutrition and monitoring are crucial for managing complications. The study also explores the impact of Vitamin D3 on dengue fever severity, finding that patients with DSS have higher levels of serum vitamin D3.

KEYWORDS

INTRODUCTION

Dengue fever is a contagious viral illness caused by the Dengue virus, affecting around 390 million people annually. It presents a range of symptoms, from mild fever to severe conditions like Dengue hemorrhagic fever and Dengue shock syndrome. The disease is primarily transmitted by Aedes aegypti mosquitoes and is primarily seen in tropical and subtropical regions. The virus is categorized into four types, with Asia responsible for over 70% of cases.[1]

Dengue hemorrhagic fever is a severe infection characterized by bleeding, decreased platelet count, and increased vascular permeability. It can cause hemo-concentration or fluid accumulation in the pleural or abdominal cavities.[2,3] The disease can be divided into three phases: febrile, critical, and recovery. Treatments include hospital treatment, emergency management, and home care. Dengue can be categorized into mild, moderate, severe, and severe. Severe dengue is characterized by three major complications: shock, bleeding, and organ involvement. The reasons behind severe dengue fever are unclear, but factors such as prior exposure, co-morbidities, and genetic vulnerability may increase the risk.[3,4] Nutritional state can also predict the disease's development in dengue cases. Vitamin D deficiency may increase the risk of severe dengue fever.[5]

Research on the correlation between vitamin D deficiency and Dengue illness severity is limited. This study aimed to assess serum 25-(OH)D levels in individuals with DF, DHF, and DSS. Vitamin D regulates immunological responses and impacts viral illness severity. It is crucial for maintaining healthy bones, regulating calcium levels, and boosting the body's immune system.[6-8] Vitamin D insufficiency is widespread globally, especially in areas with Dengue, due to factors like limited sunlight exposure, inadequate food intake, and sociocultural customs.[9]

Vitamin D plays a crucial role in the synthesis of antimicrobial peptides, regulating cytokines, and improving endothelial function, which is essential for limiting plasma leakage in severe Dengue cases. Understanding the correlation between blood Vitamin D levels and Dengue severity could offer valuable insights for treatment strategies, potentially improving clinical outcomes.[10]

Dengue fever, a major public health issue in tropical and subtropical regions, presents a range of symptoms from mild to severe. Vitamin D, often linked to bone health, is increasingly important in immunological regulation. Studying this connection in dengue patients could help understand disease progression, identify those at risk, and develop new treatment strategies. Despite advances, no reliable biomarker exists to predict severe dengue illness severity.

This study aims to estimate serum Vitamin D levels in dengue fever patients and investigate the correlation between Vitamin D3 levels and disease severity.

METHODS:

The study involved 200 Dengue fever patients admitted to S.R.N. Hospital, Motilal Nehru Medical College, Prayagraj over a period of one year. The patients were aged over 15 years, both sexes, and were included if they gave written informed consent. Patients with co-morbidities, taking glucocorticoids or anti-seizure medications, taking calcium and vitamin D3 supplements, or nursing and lactating mothers were excluded from the study.

The study protocol involved comparing blood levels of Vitamin D to the severity of the condition, which is categorized according to WHO parameters. Severe dengue infection is characterized by shock, plasma leakage, bleeding symptoms, and severe thrombocytopenia. Laboratory investigations included blood tests such as HB, TC, DC, ESR, Hct, platelet count, blood urea, serum creatinine, LFT (SGOT, SGPT), serum electrolytes, serum Vitamin D, IgM ELISA, and NS-1 Antigen. Specimen collection was done using an unhemolysed serum or plasma. Radiological investigations included USG-Abdomen and CHEST X RAY for third space fluid collection. Serum Vitamin D estimation was done using the ARCHITECT 25-OH Vitamin D method. Diagnosis of severe dengue infection was done using IgM-capture MAC-ELISA testing and ELISA-based NS-1 antigen testing.

The study used IBM SPSS Statistics 21st version for Windows to analyze data, presenting it in mean and percentage form. The chi-square test was used to compare categorical variables, while the independent t-test assessed discrete variables between groups. ANOVA was used to compare more than two groups, with a p-value of 0.05 being considered statistically significant.

RESULTS

The study involved 200 patients, categorized into three groups: Dengue Shock Syndrome (16 patients), Dengue fever (97 patients), and Dengue Haemorrhagic Fever (87 patients). The mean age was 41.06±12.54 years, with male and female patients distributed equally. The total duration of DSS was 8.63±2.13, DF was 5.84±1.88, and DHS was 6.53±2.31. The mean SBP (mmHg) was 75.94±5.64, 115.82±9.29, and 115.98±8.68, respectively. Post-hoc test results showed significant differences in SBP and DBP between DSS and DF and DHS, while no significant differences were found between DF and DHS. (Table 1)

Table 1: Association Of Frequency Gender, Mean Age, Total Duration, Day Of Maximum Temperature, SBP And DBP With Dengue-related Conditions

		DSS (n=16)		DF (n=97)		DHS (n=87)		Chi Sq.	p-Value
		n	%	n	%	n	%		
Gender	Male	13	81.25	67	69.07	63	72.41	1.06	0.588
	Female	3	18.75	30	30.93	24	27.59		
Age (years)		41.06± 12.54		41.72±15.31		42.22±12.47		F= 0.06	0.942
Fever									
Total duration		8.63±2.13		5.84±1.88		6.53±2.31		F= 12.65	<0.001
Day of max Temp.		3.25±1.18		2.97±0.97		3.01±1.19		F=0.46	0.633
SBP (in mmHg)		75.94±5.64		115.82±9.29		115.98±8.68		F=151.89	<0.001
DBP (in mmHg)		57.38±7.51		76.13±7.04		75.87±6.69		F=53.28	<0.001

The study reveals a significant correlation between dengue symptoms and diseases. Joint pain is observed in 100.00% of patients with dengue shock syndrome (DSS), 93.81% of cases with dengue fever (DF), and 96.55% of cases with dengue hemorrhagic syndrome (DHS). Skin rashes are observed in 87.50% of cases, while vomiting is reported in 92.78% of cases. Headache is reported in 93.75% of cases, while retroorbital pain is observed in 100.00% of cases. Abdominal pain is reported in 100.00% of cases, and dysguesia is found in 93.75% of cases. Lethargy is observed in all cases. (Table 2)

Table 2: Association Of Frequency Of Different Symptoms And Diet With Dengue-related Conditions

	DSS (n=16)		DF (n=97)		DHS (n=87)		Chi Sq.	p-Value
	n	%	n	%	n	%		
Joint Pain	16	100.00	91	93.81	84	96.55	1.63	0.445
Rashes	14	87.50	86	88.66	83	95.40	3.04	0.219
Vomiting	16	100.00	90	92.78	86	98.85	5.12	0.077
Headache	15	93.75	95	97.94	87	100.00	3.98	0.137
Retroorbital Pain	16	100.00	84	86.60	85	97.70	9.56	0.008
Abdominal Pain	16	100.00	94	96.91	86	98.85	1.24	0.538
Dysguesia	15	93.75	92	94.85	86	98.85	2.57	0.277
Pruritus	16	100.00	91	93.81	87	100.00	-	-
Malena	14	87.50	0	0.00	83	95.40	177.72	<0.001
Haematemesis	0	0.00	0	0.00	28	32.18	42.29	<0.001
Epistaxis	1	6.25	0	0.00	42	48.28	65.73	<0.001
Lethargy	16	100.00	97	100.00	87	100.00	-	-
Diet								
MIXED	11	68.75	43	44.33	30	34.48		0.031
VEG	5	31.25	54	55.67	57	65.52		

The study found no significant differences in the mean Total Leukocyte count (TLC), mean Necrosis Factor (N), mean L, mean Plt Count at admission, mean PLT Recovery Time (days), mean MCV (fL), mean SGPT (U/L), mean SGOT (U/L), mean S. Urea (mg/dL), and mean S. Creatinine (mg/dL) between dengue-related conditions. However, the association of S.Vit D3 with dengue-related conditions was significant. The mean S.Vit D3 (ng/mL) was significantly different between dengue-related conditions. The mean difference between DSS and DF was 3.68, DSS and DHS was 1.67, and DF and DHS was -2.01, indicating significant differences in S.Vit D3 levels between all pairs of conditions. The mean TLC, N, L, Plt Count at admission, PLT Recovery Time, MCV, SGPT, SGOT, S. Urea, and Creatinine were not significantly different between dengue-related conditions. (Table 3)

Table 3: Association Of Biochemical Parameters And S. Vitamin D3 With Dengue-related Conditions

	DSS (n=16)	DF (n=97)	DHS (n=87)	F	p-Value
	Mean±SD	Mean±SD	Mean±SD		
TLC ($x10^3$)	6.09±2.10	5.76±2.46	5.97±2.05	0.28	0.754
N (%)	56.20±17.22	54.71±15.13	53.10±14.13	0.44	0.646
L (%)	29.46±10.16	35.19±22.92	33.15±11.50	0.82	0.443
Plt Count At admission	0.27±0.11	0.70±0.26	0.33±0.09	93.75	<0.001
PLT Recovery Time	5.00±1.86	2.37±1.90	2.77±2.04	12.34	<0.001
MCV	89.27±8.41	95.71±92.67	86.21±8.89	0.50	0.610
SGPT	187.56±16.54	88.10±58.17	108.30±73.44	17.11	<0.001
SGOT	172.93±24.62	125.06±86.57	163.99±122.55	4.01	0.020
S. Urea	27.90±9.84	28.29±9.07	33.30±27.94	1.63	0.199
S. Creatinine	1.46±0.08	1.07±0.24	1.10±0.18	26.15	<0.001
S. Vitamin D3	17.31±2.08	13.63±2.08	15.64±1.92	36.34	<0.001

The study found significant differences in the frequency of Hepatomegaly, Splenomegaly, Pleural Effusion, and Ascites among dengue-related conditions among patients. Hepatomegaly was more prevalent in DSS patients (100.00%) than in DF patients (12.37%), splenomegaly (9.28%), pleural effusion (34.02%), and ascites (95.40%). These findings suggest a significant association between dengue-related conditions and these conditions. (Table 4)

Table 4: Association Of Frequency Of Hepatomegaly, Splenomegaly, Pleural Effusion And Ascites With Dengue-related Conditions

	DSS (n=16)		DF (n=97)		DHS (n=87)		p-Value
	n	%	n	%	n	%	
Hepatomegaly	16	100.00	12	12.37	23	26.44	<0.001
Splenomegaly	16	100.00	9	9.28	17	19.54	<0.001
Pleural Effusion	16	100.00	33	34.02	83	95.40	<0.001
Ascites	16	100.00	33	34.02	83	95.40	<0.001

The study examines the association between dengue serology results (NS1, IgM, and IgG) and various dengue-related conditions. The results show a significant difference in NS1 positivity among conditions, with positive results in DSS (81.25%), negative results in DF (43.30%), and positive results in DHS (56.70%). IgM positivity was positive in DSS (50.00%), negative in DF (42.27%), and positive in DHS (42.27%). IgG positivity was positive in DSS (20.00%), negative in DF (13.44%), and positive in DHS (87.36%). (Table 5)

Table 5. Association Of Frequency Of DENGUE SEROLOGY With Dengue-related Conditions

DENGUE SEROLOGY		DSS (n=16)		DF (n=97)		DHS (n=87)		p-Value
		n	%	n	%	n	%	
NS1	Positive	13	81.25	42	43.30	43	49.43	**0.019**
	Negative	3	18.75	55	56.70	44	50.57	
Ig M	Positive	8	50.00	56	57.73	45	51.72	0.667
	Negative	8	50.00	41	42.27	42	48.28	
Ig G	Positive	4	25.00	11	11.34	11	12.64	0.319
	Negative	12	75.00	86	88.66	76	87.36	

Table 6. Association Of Platelet Transfusion And Total Duration Of Stay With Dengue-related Conditions

		DSS (n=16)		DF (n=97)		DHS (n=87)		Chi Sq.	p-Value
		n	%	n	%	n	%		
Platelet transfusion	Yes	7	43.75	11	11.34	66	75.86	78.40	<0.001
	No	9	56.25	86	88.66	21	24.14		
Total duration of stay (mean±SD)		6.94±1.73		3.41±1.41		5.47±2.56		F=16.56	<0.001

The study found significant differences in the total duration of stay between dengue-specific syndrome (DSS), dengue-specific hepatitis (DF), and dengue-specific hepatitis (DHS) patients. The mean difference was 3.53 days, 1.47 days, and -2.06 days, respectively. However, no significant difference was found between DSS and DHS. Platelet transfusions were associated with three dengue-related

conditions: DSS, DF, and DHS. In DSS patients, 43.75% needed platelet transfusions, while in DF patients, 11.34% received a transfusion, while in DHS patients, 75.86% needed transfusions. The Chi-square test showed a strong association between dengue-related conditions and platelet transfusions, suggesting the need for platelet transfusions in severe dengue, especially DHS. The total duration of stay was also significantly different among dengue-related conditions.(Table 6)

DISCUSSION

The study analyzed dengue fever (DF) and dengue hemorrhagic fever (DHF) among 200 participants. Dengue fever was the most common, followed by DHF with 43.5% and DSS with 8%. The data aligns with previous studies, which found that most dengue infections were milder (DF) and more severe variants (DHF and DSS) required careful clinical management.[11,12] The mean age of patients with DSS was 41.06±12.54 years, while those with DF had a mean age of 41.72±15.31 years. There was no significant difference in age among individuals with other dengue-related disorders, including dengue hemorrhagic fever. The average age for patients diagnosed with DSS was 41.06 years, while for those diagnosed with DHF, it was 41.72 years. The control group had an average age of 43.17 years, and no significant difference in age between the control group and dengue patients.

The study reveals that the majority of dengue-related conditions are male, with a higher proportion of males (81.25%) in the DSS group compared to 69.07% in the DF group and 30.93% in the DHS group. This disparity in gender is consistent with previous research suggesting that men may be more vulnerable to severe dengue manifestations. Factors contributing to this disparity include behavioral, hormonal, and hereditary variables. Males are more likely to be bitten by mosquitoes due to their increased exposure to mosquitoes and biological variations between males and females.[13,14] The mean duration of illness in DSS patients was 8.63±2.13 days, compared to 5.84±1.88 days in DF patients and 6.53±2.31 days in DHF patients. DSS is longer and more severe than DF and DHF, requiring more clinical treatment and monitoring. The study found no significant difference in maximum daily temperature between conditions, indicating that all three diseases have their peak fever around the same time period. This suggests that fever patterns alone cannot determine dengue disease severity, emphasizing the need for comprehensive clinical examination and monitoring.[15]

The study found no significant gender difference in patients with dengue shock syndrome (DSS), dengue fever (DF), or dengue hemorrhagic fever (DHF). This suggests that gender does not affect the type or severity of dengue infection. This finding is consistent with a previous study by Annan et al. (2023), which also found no significant sex difference in primary and secondary dengue disease, confirming that gender does not affect dengue risk or severity.[16]

Chandra et al. (2013) found no gender-specific effect on reduced platelet count in dengue disease, suggesting that oxidative damage to platelets is the decisive factor.[17] Other hematologic and biochemical markers did not differ significantly between dengue conditions. However, blood levels of vitamin D3 varied widely among different dengue diseases, suggesting that vitamin D may impact disease severity. The study found significant variations in vitamin D concentrations in dengue patients with different degrees of severity, indicating that lower levels are linked to a more unfavorable progression of the dengue illness. Other hematologic and biochemical markers failed to differentiate between dengue forms. These studies suggest that those vulnerable to dengue may need sufficient vitamin D supplementation. Further research is needed to examine the impact of vitamin D on dengue infection and therapy, especially through longitudinal studies and randomized controlled trials.

The study found that all patients with dengue shock syndrome (DSS) and dengue fever (DF) and dengue hemorrhagic syndrome (DHS) have joint symptoms, with skin rashes, vomiting, headaches, retroorbital discomfort, abdominal discomfort, dysgia, pruritus, malena, hematemesis, epistaxis, and lethargy being common. Skin rashes are present in 87.50% of DSS, 86.66% of DF, and 95.40% of DHS patients. Headaches are reported in 93.75% of DSS, 97.94% of DF, and 98.85% of DHS patients. Abdominal discomfort is reported in 100.00%, 96.91%, and 98.85% of cases, respectively. Hematemesis is reported in 32.18% of DSS and DF patients, and epistaxis is reported in 6.25% of DSS, 0.00% of DF, and 48.28% of DHS patients.

The study found that dengue fever (DHF) patients have more severe bleeding symptoms than those with DF and DSS, highlighting the severity of the condition and the importance of monitoring and treating its symptoms. DHF can cause severe bleeding through malena, hematemesis, and epistaxis, suggesting significant vascular leakage and coagulopathy. Other studies support this, indicating that DHF patients have significantly fewer platelets, which are needed for blood clotting. Low antioxidant levels may also exacerbate bleeding in DHF patients. [8,17]The findings suggest that DHF patients have more severe bleeding symptoms that require more intensive medical treatment, and must be recognized and treated immediately to avoid hypovolemic shock and organ failure.

A study on blood pressure changes in dengue fever, dengue hemorrhagic fever, and dengue shock syndrome revealed significant differences in systolic and diastolic blood pressure.[64] Dengue Shock Syndrome (DSS) patients had lower average systolic blood pressure and lower average diastolic blood pressure, indicating severe hemodynamic instability. This highlights the importance of understanding the impact of acute defertility on dengue fever and dengue shock syndrome. Post-hoc tests showed no significant changes in SBP and DBP between DF and DHF, suggesting similar blood pressure profiles.

Dengue fever is a severe febrile illness characterized by increased vascular permeability, decreased blood volume, hemodynamic abnormalities, and shock. Hematology is a crucial indicator of patient health, and studies have shown that dengue patients have significantly lower platelet counts than healthy controls.[18,17,19] This could be due to oxidative damage to platelets due to low antioxidant levels, as suggested by Chandra et al. (2013).[17]

The study found that patients with dengue shock syndrome (DSS) had an average vitamin D3 level of 17.31±2.08 ng/ml, which was higher than the average levels in patients with dengue fever (DF) and dengue hemorrhagic syndrome (DHS). The mean vitamin D3 level in patients with dengue was significantly higher than the control group, with an average difference of -6.47 ng/ml and a p-value of less than 0.001. This suggests significant disparities among the groups, which could be used as a biomarker to determine the risk of severe dengue sickness. Monitoring vitamin D3 levels in patients with dengue fever can help identify those more prone to severe consequences, allowing for timely and suitable therapy interventions.[10,20] The study also examined the vitamin D levels in the blood of dengue patients and the type of fever. Dengue fever was the most common type, followed by dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). The mean vitamin D3 blood levels were significantly different between the groups, with significant differences observed between DSS and DF, DSS and DHF, and DF and DHF. Other studies support these findings, suggesting that vitamin D levels may worsen dengue symptoms.[6,11] Studies have shown that insufficient levels of vitamin D can increase the likelihood of severe dengue sickness and improve treatment effectiveness. High serum 25-(OH) D levels can alleviate symptoms of dengue fever and lower the chances of severe dengue hemorrhagic fever or dengue shock syndrome. [6-9] Vitamin D may reduce dengue fever severity by modulating immune responses and pathogen defense systems. Studies have found significant differences in blood vitamin D levels in dengue patients with varying severity, suggesting that low levels are associated with poorer dengue outcomes.[21,22] Further research is needed to determine the cause and treatment of these diseases. Hepatomegaly, splenomegaly, pleural effusion, and ascites were studied in patients with dengue shock syndrome, dengue fever, and dengue hemorrhagic fever.

A study found that hepatomegaly was present in 100.00% of severe dengue syndrome (DSS) patients, 12.37% of DF patients, and 26.44% of DHF patients, indicating a high prevalence of the disease. Hepatomegaly may be caused by viral invasion, immune-mediated damage, or both. Splenomegaly was found in 100.00% of DSS patients, 9.28% of DF patients, and 19.54% of DHF patients, indicating a higher incidence of splenomegaly in severe dengue patients. Pleural effusion was found in 100.00% of DSS patients, 34.02% of DF patients, and 95.40% of DHF patients, indicating a higher vascular permeability in severe dengue patients. Ascites were found in 100.00% of DSS patients, 34.02% of DF patients, and 95.40% of DHF patients, indicating fluid imbalance and vascular leakage. DSS

patients have a high rate of these symptoms, necessitating careful clinical monitoring and therapy.[17,23-26]

The study reveals significant differences in food distribution between patients with dengue shock syndrome (DSS), dengue fever (DF), and dengue hemorrhagic fever (DHF). Among DSS patients, 68.75% had a mixed diet, while 31.25% had a vegetarian diet. These findings suggest that diet may influence the severity of dengue fever. Nutritional status influences immune response and disease progression, and deficiencies can exacerbate dengue. Adequate nutrition improves vascular integrity, which may reduce DSS symptoms. The study emphasizes the importance of food and nutrition in managing and preventing severe dengue fever. Public health initiatives may require a balanced diet, and further research is needed to develop dengue-specific nutritional therapies. Primary dengue infection leads to high IgM and IgG antibody titers, providing lifelong immunity to the infected serotype. Classical dengue fever is often caused by re-infection with a new or unknown DENV serotype.[18,26-27]

The study analyzed the positivity of IgM and IgG antibodies, as well as the NS1 antigen, among patients with dengue shock syndrome (DSS), dengue fever (DF), and dengue hemorrhagic fever (DHF). The NS1 antigen was found to be more commonly positive in DSS patients, suggesting a greater viral load or stronger viral replication. IgM antibody positivity was similar across all conditions, with positive rates of 50.00% for DSS, 57.73% for DF, and 51.72% for DHF. IgG antibody positivity was 25.00% in DSS, 11.34% in DF, and 12.64% in DHF, with no significant changes in IgG positivity. The significant difference in positive NS1 antigens suggests that NS1 could be used for early detection of severe dengue patients, especially in DSS. However, IgM and IgG positivity did not change significantly in different situations, suggesting that these antibodies alone may not be a good indicator of dengue infection severity.[30,31]

The study found that dengue shock syndrome (DSS) patients had the longest hospital stay at 6.94±1.73 days, followed by dengue fever (DF) patients at 5.47±2.56 days and dengue hemorrhagic syndrome (DHS) patients at 3.41±1.41 days. This indicates that DSS is more severe and complicated than DF and DHF, requiring longer medical care and monitoring. DSS patients often require intensive therapy for shock, fluid imbalance, and organ failure, prolonging hospitalization.[23,24] The need for platelet transfusions varied significantly between dengue-related diseases. 43.75% of patients with DSS required platelet transfusions, while 56.25% did not. Only 11.34% of patients with DHF required transfusions, while 88.66% did not. The greatest difference was observed in patients with DHS, where 75.86% required transfusions. There is a significant correlation between dengue-related diseases and platelet transfusions, emphasizing the need for platelet transfusions, especially in severe dengue diseases like DHS. The study supports the literature that severe dengue symptoms require platelet transfusions, as evidenced by Chakravarti et al (2020) and Dissanayake et al (2021). All DSS, DHF, and DF patients were discharged from the hospital, with a 100% discharge rate.[11,32]

The study's small sample size and single-centre design may hinder generalizability, as cross-sectional studies cannot establish a causal relationship between vitamin D levels and dengue fever severity. Future research should use larger, multicentre samples, consider confounding variables, ensure consistent measurements, and include additional indicators.

CONCLUSION:

The study reveals differences in clinical presentation, treatment requirements, and outcomes between Dengue Shock Syndrome (DSS), Dengue Deficiency (DF), and Dengue Hemorrhagic Syndrome (DHF) patients. Platelet transfusions are crucial for managing severe dengue, and early recognition and intensive treatment are essential. Nutrition and monitoring are crucial for managing complications. The study also explores the impact of Vitamin D3 on dengue fever severity, finding that patients with DSS have higher levels of serum vitamin D3

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