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Evaluation of Liver and Renal functions among Sudanese Patient with dengue fever

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ABSTRACT
Objective:
Dengue fever (DF) is a common disease and can cause public health alarm, particularly in developing countries. It has serious complications of DF encompass including hemorrhage; a hemodynamic collapse that may additionally progress to, multi-organ dysfunction such as renal dysfunction, and liver failure.
Method: *This is a case-control study conducted at Kassala Hospital, Kassala State, Sudan; during the period of October 2019 to March 2020. The total number of participants 84. Then divided into two groups. Cases and Controls group. All the investigations were measured by a full automation instrument analyzer; according to the manufacturer's instructions (Bio-system- A25, Costa Brava3008030, Barcelona, Spain).*
Results: *The result showed a significant increase in the Urea levels P. Value = 0.00) and an increase in creatinine concentration, P.value =0.001) among the case group, and decreed concentration of Potassium and Sodium in the case group (P. value = 0.00), (.P. value =0.00) than in controls, respectively there was a significantly decreased in potassium and sodium concentration among the DHG group, (P. Value = 0.00) (P. value =0.01) respectively. The results showed a significant increase in AST, ALT, and ALP levels among the case group, little increase in total bilirubin concentration, and little decreed in Protein and Albumin concentrations, P. Value =0.05, P. value =0.05 respectively.*
Conclusion: *Our study showed that the renal function tests are changed in patient group of hemorrhage DHF. The study also showed a high level of AST, ALT, and ALP concentration in patients' group with hemorrhage (DHF), while there was a significant decrease in albumin and protein levels among patients with (DHF).*
Keywords: *Dengue fever; Renal function; Liver function; Sudan.*

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I. Introduction

Dengue fever (DF) is a developing clinical and public health alarm, particularly in developing countries. DF is described as an arthropod-borne arbovirus belonging to the flavivirus household infection; it is frequently transmitted via the bite of the Aedes egypti mosquito [1]. It has four genotypes known as: DEN 1, 2, 3, and four [2]. It is identified by way of the non-segmented and single-stranded, RNA virus [3, 4]. Dengue fever (DF) is now not an uncommon disease; there has been an exaggerated extent in the wide variety of cases of dengue fever (DF) recently, The World Health Organization estimates almost 50 million humans are infected every year. DF was used to be established in the tropical and sub-tropical areas Dengue has been abundant in many countries such as India in which more than 100,000 people are infected by means of dengue fever,

roughly around 15,000 of these cases are from the state of Karnataka[6].in the previous few years, and the overall prevalence of laboratory-confirmed dengue is 38.3% as stated with the aid of formerly works [7,8].DF is responsible for substantial human morbidity, resulting in 10,000 deaths [9-11], and additionally has an economic influence, roughly estimated to be around 8.9 billion US Dollars globally, especially among the lower socioeconomic [12,13]. The clinical features of dengue infections are varied from mild and flu-like illness which is indistinguishable from any other type of febrile infection. In some cases, patients can progress to a severe and fatal form of dengue disease recognized as dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) [14]. Complications, in many instances three to four days after the starting of fever, can improve in a few patients. Factors such as age, obesity, diabetes, and hemolytic illnesses may additionally amplify the risk of severe dengue and mortality [15, 16]. The most serious complications of DF encompass hemorrhage and hemodynamic collapse that may additionally progress to, multi-organ dysfunction such as renal dysfunction, liver failure, and encephalopathy. Rarely post-dengue infections like diaphragmatic paralysis and phrenic neuropathy can be taking place [17, 18]. Although dengue virus is a non- hepatotropic virus, Hepatomegaly is frequently viewed in dengue alongside liver dysfunction that varies from mild to even hepatic failure [19]. Renal issues related to DF included glomerulonephritis, proteinuria, IgA nephropathy to acute kidney injury (AKI) [20]. DF is also associated with seizures due to unbalanced electrolytes [21, 22]. Few types of research specifically in Sudan focused on the renal and hepatic involvement in dengue infection. So this study was conducted to inspect renal and liver function tests in patients with dengue viral infection so as to assess the severity of the disorder and add to our research on dengue viral infection

II. Methods

Study site and design: This is a case control study conducted at Kassala Hospital, Kassala State, Sudan; during the period of October 2019 to March 2020. Kassala Hospital is a public tertiary hospital. The study achieved during the pandemic of dengue fever in Kassala State.

The total participants 84. Then divided into two groups. Cases group were 54 patients with fever (13 DHF and 41 DF), and 30 healthy individuals were the control group.

Inclusion Criteria: Serologically positive results for dengue fever, low TWBCs, and platelet count.

Exclusion Criteria: Any patient with diabetes mellitus, heart disease renal disease, liver disease, malaria.

Data collection: After signing the informed consent, the demographic characteristics of the patient, and clinical data was obtained from each group (cases and controls) by using questionnaire, which filled by trained medical staff.

Sample collection and laboratory analysis: 5 ml of venous blood was collected from each group under aseptic condition, in EDTA& heparin blood containers, then centrifuged and stored at −20C till the assay of: Liver function tests, and Renal function tests. All the investigations were measured by a full automation instrument‘analyzer; according to the manufacturer’s instructions (Bio-system- A25, Costa Brava3008030, Barcelona, Spain).

Data analysis:

Data were analyzed by using SPSS for windows (version 20). *t*.test was used to compare between the two groups (cases and controls). Chi-esquire test was used for the qualitative variables, and correlation test for the quantitative variables. Continuous variables were expressed as mean+/- S.D, and the results are showed in form of tables and figures. A P value of was considered significant.

Ethical clearance

Ethical approval was obtained from the Research Ethics Committee, Faculty of medical laboratory science, Alzaiem Alazhari University, Khartoum, Sudan. Informed consent was obtained before sample collection, from all the participants included in this study.

III. Results

This study comprises 84 participates, 54 patient with Dengue fever as case group, and 30 normal individual as control group. The mean age of patients was 24 years and of control was 33years. In the study group 26 (69%) of patents were males and 24(57%) were females, while 15 (30.5%) of control were males and 15 (42 %) females **Figure.1**. In the case group, 13(24.07%) patients were suffering from dengue fever accompanied with bleeding DHF while 41(75.93%) as DF without bleeding complication as illustrated in **Figure.2.** The result showed no significant relationship between creatinine concentration among case and control groups (*P*. value =0.9), however, there was a significant increase in urea levels among the case group, *P*. Value = 0.00).and decreed concentration of Potassium and Sodium in the case group (*P*. value = 0.00), (P. value =0.00) respectively, **Table.1.** Study confirmed that there is no significant relation between Renal Function Test (RFT) parameters and gender distributions among the case group, **Table.2**. The result showed no significant relationship between urea concentration among DF and CHF groups (P. value =0.374), but also showed in this study there was a significantly decreased potassium and sodium concentration among the DHG

group, (P. Value = 0.00) (P. value =0.01) respectively. And increased creatinine concentration, P.value =0.001, **Table.3**. The results showed no significant relation between in direct bilirubin concentration among case and control groups, *P. value* =0.15. In this study there was significant increase of AST, ALT and ALP level among case group, *P. Value* =0.00, P. *value* =0.00, and P. *value* =0.00, respectively, and little increased in total bilirubin concentration, *P. value* =0.02) and little decreed of Protein and Albumin concentrations, *P. Value* =0.05, *P. value* =0.05, **Table 4**. In this study there no significant relationship between LFT parameters and gender distributions among case group, **Table 5.**

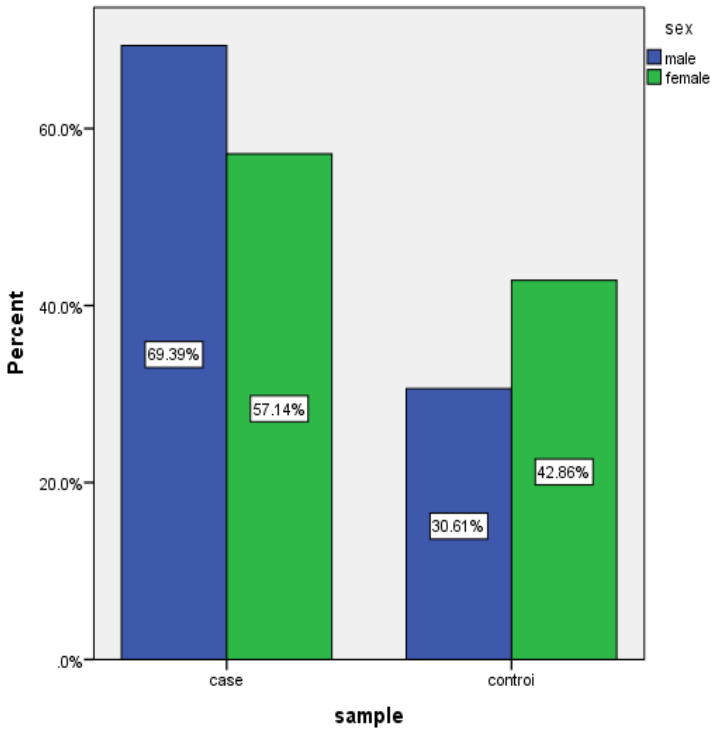
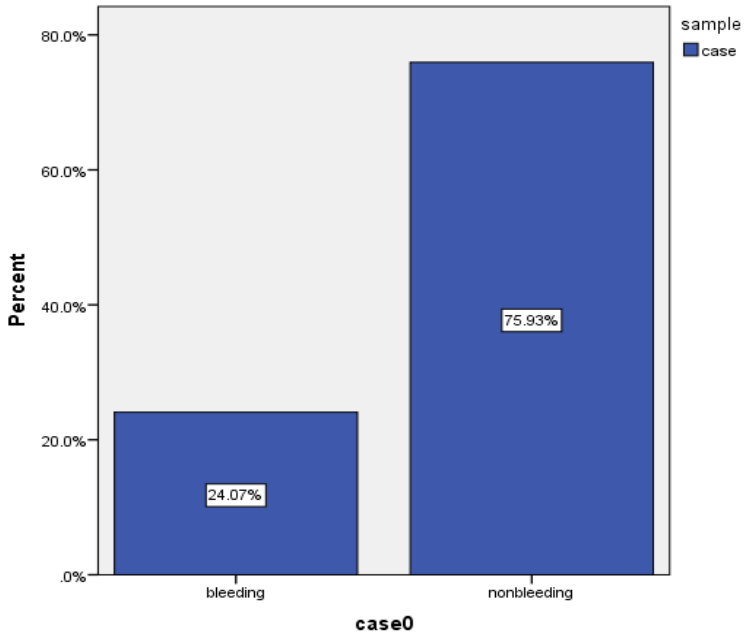


Figure.1: Gender distribution in case and control groups



Figur.2 showed bleeding classification of dengue fever groups

Table.1: Association between RFT parameters among study groups

variables mg/l	Study groups		*P.value*
	Case	Control	
Urea	25±7	19±3	0.00
Creatinine	0.84±0.26	0.83±0.200	0.9
K	3.1±29	3.7±0.22	0.00
Na	118±3.2	133±3.9	0.00

Table. 2: Association between RFT parameters and gender among case group

variables mg/l	Study groups		*P.value*
	Male	Female	
Urea	26.6±7	23.8±5	0.l74
Creatinine	0.84±0.28	0.83±023.0	0.87
K	3.2 ±26	3 .0±0.33	0.213
Na	117±3.7	118±4.2	0.874

Table.3: Association between RFT concentrations among dengue fever groups.

variables mg/l	Study groups		*P.value*
	DHF	DF	
Urea	27±10	24±5	0.374
Creatinine	1.0±0.36	0.7 ±0.17	0.001
K	2.8±26	3 .2 ±0.13	0.000
Na	115±3.9	118±3.6	0.01

Table.4: Association between LFT parameters among study groups.

variables	Study groups		*P.value*
	Case	Control	
Protein g/dl	6.30±0.70	6.70±0.40	0.05
Albumin mg/dl	3.40±0. 60	3.70 ±0.20	0.05
T.B mg/dl	0.90 ±0.50	0.70±0.10	0.02
D.B mg/dl	0.20±0.17	0.10±0.04	0.15
AST IU/L	46.0±18.0	17.0±3.0	0.00
ALT IU/L	36.0±13.0	15.0±12.0	0.00
ALP IU/L	142.0±22.0	103.0±9.0	0.00

Table 5: Association between LFT parameters and gender among case group.

variables	Study groups		*P.value*
	Male	Female	
Protein g/dl	6.50 ±72.0	6.20 ±77.0	0.24
Albumin mg/dl	3.50 ±0.70	3.40 ±0.50	0.50
T.B mg/dl	0.90 ±0.70	0.80 ±0.30	0.45
D.B mg/dl	0.20±0.20	0.21 ±0.10	0.92
ASTIU/L	45.0±12.0	48.0±13.0	0.51
ALT IU/L	36.50±13.30	36.40±13.20	0.9
ALP IU/L	138.0±17.0	147.0±25.0	0.13

IV. Discussion

The current study confirmed that the number of males is more than females in the case group; 26 (69%), and 24(57%), respectively. While in the control group the female's number slightly increased 15 (30.5%) of control were males and 15 (42 %) females. Our study results showed a significant increase in Urea concentration among the case group, (25±73, P. Value = 0.00) and a decrease in the concentration of Potassium (3.1±29, P. Value = 0.00) and Sodium (118±3.2, P. Value =0.00), among the case group. The study results showed insignificant results in Urea concentration among the DHF cases group (P. value =0.374). This study was agree with the study done by Ali SA et al 2022) [23] that confirmed an increase in Urea and creatinine levels in patients with DHF (35.92±18.34 than in DF, 1.04±0.39 $p<0.001$ than 0.88±0.23). In this study, there was a significant decrease in potassium and sodium concentration among the DHF group, (2.3 ±26), (115±3.9) compared with CDF (2.8 ±0.13), (118±3.6). (P. Value =0.00), (P. value =0.01) respectively. Also reported a significant increase in creatinine concentration in patients with DHF. (1.0±0.36) compared with CHF patients (0.7 ±0.17) (P. value =0.001). Our study showed a significant increase of AST, ALT and ALP levels among case group (46±18)(P. Value =0.00),(36±13) (P. value =0.00),(142±22) (P. value =0.00),respectively, and increased in total bilirubin concentration (0.9 ±0.5)(.P. value =0.02) and decreed of Protein and Albumin concentrations (P. Value =0.05) (P. value =0.05) respectively. Also was a significant increase in AST and ALT

levels among DHF (73±23), (55±17) respectively compared to DF (39±4), (31±13) respectively, (P. Value =0.001),(P. Value =0.001) respectively. This study agrees with a study done by (Vakrani, et al 2017) [24].

V. Conclusion:

Our study showed a high level of AST, ALT, and ALP concentration in patients' group with hemorrhage (DHF), and there was a significant decrease in albumin and protein levels among patients with (DHF). The Urea and Creatinine concentrations in the patient group of hemorrhage DHF were increased. Potassium and Sodium among patients with DHF were significantly decreased. That concludes that renal and liver studies are important and should be considered in dengue fever

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Competing interests: The authors declare that they have no competing interests.

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