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Coinfection Of Dengue Hemorrhagic Fever (DHF) Grade 1 And Typhoid Fever

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Abstract

Coinfection of dengue hemorrhagic fever and typhoid fever is a clinical condition that is difficult to manage because both diseases share overlapping manifestations such as prolonged fever and gastrointestinal complaints. This case study aims to describe the clinical and laboratory profile and to evaluate the pharmacotherapy, including the identification of drug related problems, in a patient with coinfection of dengue hemorrhagic fever grade 1 and typhoid fever. The method used was a descriptive case study of one nineteen year old male patient treated at the Internal Medicine Ward of Arifin Achmad Regional General Hospital, Pekanbaru, from 19 to 23 September 2026, with data obtained from the medical record and assessed using the subjective, objective, assessment, and plan approach. The results showed a positive dengue NS1 antigen, reactive dengue IgG, nonreactive dengue IgM, and reactive Anti Salmonella IgM with a score of six, accompanied by thrombocytopenia reaching twenty five thousand per microliter and early leukopenia. The therapy was generally appropriate in indication and dosage, but the use of ketorolac in a thrombocytopenic dengue patient was identified as a drug related problem. In conclusion, the coinfection was confirmed clinically and serologically, and the pharmacist plays an essential role in identifying the bleeding risk and recommending paracetamol as the safer analgesic.

Keywords: Coinfection, Dengue Hemorrhagic Fever, Drug Related Problem, Pharmaceutical Care, Typhoid Fever

INTRODUCTION

Infectious diseases such as dengue hemorrhagic fever and typhoid fever remain significant public health problems in developing countries, including Indonesia (Buck, 2023). According to the World Health Organization, dengue has become a major health problem in Southeast Asia, including Indonesia, with the number of cases rising sharply in recent years (Sirisena, 2021). Typhoid fever, which is caused by infection with *Salmonella enterica serovar Typhi*, also remains a considerable challenge in developing countries, with an estimated eleven to twenty million cases each year globally (Buck, 2023). The simultaneous occurrence of both infections in a single patient, known as coinfection, creates additional difficulty in diagnosis and therapy because the two diseases share overlapping clinical features such as prolonged fever and gastrointestinal complaints.

Dengue is a viral infection transmitted by the *Aedes aegypti* mosquito and is highly prevalent across the tropical and subtropical regions of the world, placing more than four billion people at risk. Based on records from the World Health Organization, approximately five hundred thousand people with severe forms of dengue infection require hospital care every year, including the pediatric group. The same report notes that about two and a half percent of the hospitalized population die from complications associated with the severe form of dengue. Studies also indicate that the likelihood of acquiring dengue infection is highest among individuals in the thirty to forty five year age group, and this same group experiences most of the dengue related deaths each year (Sirisena, 2021).

Typhoid and paratyphoid fevers are febrile multisystem illnesses that are clinically indistinguishable, caused by the serotypes *Salmonella enterica Typhi* and *Salmonella Paratyphi* A, B, and C. Collectively known as enteric fever, more than nine million people are affected and around one hundred ten thousand people die from this disease each year

worldwide (Lopez, 2021). Enteric fever is a leading cause of community acquired bloodstream infection in South and Southeast Asia. After an incubation period of six to thirty days, enteric fever appears insidiously with a slow onset of fever accompanied by fatigue, anorexia, headache, malaise, and abdominal symptoms (Farich, 2020). If treatment is delayed or inadequate, meningitis, sepsis, or intestinal perforation may occur. Given the history of *Salmonella Typhi* and *Salmonella Paratyphi* rapidly developing antimicrobial resistance alongside repeated antibiotic use, the recent emergence of extensively resistant strains has greatly complicated treatment and raised serious concern (Bhandari, 2025).

The dengue hemorrhagic fever case was selected because it is a condition that requires intensive management and monitoring to prevent more severe complications. Patients with dengue hemorrhagic fever require appropriate supportive therapy, particularly in maintaining fluid and electrolyte balance, as well as periodic monitoring of the clinical condition and laboratory parameters such as the platelet count, the hematocrit, and the signs of bleeding. In addition, the use of several types of drugs in dengue patients needs attention because certain medications may increase the risk of bleeding or produce undesirable effects. Therefore, an evaluation of the appropriateness of drug selection, dosage, and the potential for interactions and side effects during therapy is required.

Based on these considerations, this case was chosen because it illustrates the importance of the pharmacist role in ensuring that the therapy given is appropriate, safe, and effective, as well as in conducting drug therapy monitoring to support the improvement and safety of the patient. This case study aims to describe the clinical picture and the manifestations in a patient with coinfection of dengue hemorrhagic fever and typhoid fever, to explain the relationship between the two conditions, and to identify the possible drug related problems arising from the drug therapy administered.

RESEARCH METHODS

This study was a descriptive case study with a prospective observational approach conducted on a single patient during the Apothecary Professional Practice Program at the Internal Medicine Ward of Arifin Achmad Regional General Hospital, Pekanbaru. The subject was one patient, a nineteen year old male with a body weight of eighty kilograms, who was hospitalized from 19 to 23 September 2026 with a medical diagnosis of coinfection of dengue hemorrhagic fever grade 1 and typhoid fever. The patient was selected purposively based on the clinical relevance of the case and the completeness of the medical data. The instruments used in this study were the patient medical record, the results of physical examination, the vital sign measurements, the clinical pathology and hematology laboratory data, the immunology and serology examinations, and the list of drug therapy received, which were analyzed together with standard references on dosing, drug interactions, and dengue management guidelines (Kemenkes RI, 2020).

Data collection was carried out chronologically by reviewing the patient medical record and observing the clinical condition during the hospitalization period from 19 to 23 September 2026. The pharmaceutical care assessment was arranged using the subjective, objective, assessment, and plan method, which included an evaluation of the appropriateness of the drug indication, the appropriateness of the dosage, the potential for drug interactions, and the potential for side effects, followed by the identification of drug related problems. The data were analyzed descriptively by comparing the clinical and laboratory data of the patient with the reference values and with the standard therapeutic guidelines, without the use of statistical software, and the conclusion was drawn qualitatively based on the correlation between the clinical picture, the laboratory results, and the therapy administered.

RESULTS AND DISCUSSION

The patient was a nineteen year old male with a body weight of eighty kilograms who was treated at the Internal Medicine Ward of Arifin Achmad Regional General Hospital, Pekanbaru, from 19 to 23 September 2026 with a working diagnosis of coinfection of dengue hemorrhagic fever grade 1 and typhoid fever. The results of the case assessment are presented in the following tables, each of which is followed by a description, and are then discussed in relation to the confirmation of the diagnosis and the evaluation of the pharmacotherapy.

Table 1. Patient Identity and Subjective Data

Component	Description
Identity	Male, nineteen years old, body weight eighty kilograms
Hospital and ward	Internal Medicine Ward, Arifin Achmad Regional General Hospital, Pekanbaru
Treatment period	19 to 23 September 2026
Diagnosis	Coinfection of dengue hemorrhagic fever grade 1 and typhoid fever
Chief complaint	Fever for five days before admission
Accompanying complaints	Chills, pain throughout the body, retro orbital pain, headache, nausea, and vomiting more than three times

Source: Primary data (2026)

The patient was a nineteen year old male with a body weight of eighty kilograms who was admitted to the Internal Medicine Ward of Arifin Achmad Regional General Hospital, Pekanbaru, and treated from 19 to 23 September 2026 with a working diagnosis of coinfection of dengue hemorrhagic fever grade 1 and typhoid fever. On admission the patient complained of fever that had lasted for five days before entering the hospital, accompanied by chills, pain throughout the body, retro orbital pain, headache, nausea, and vomiting that occurred more than three times. These subjective complaints are consistent with the clinical picture of acute dengue infection, which typically presents with acute fever, headache, retro orbital pain, and myalgia, while the fever together with gastrointestinal disturbance such as nausea and vomiting may also be found in typhoid fever, so that the initial complaints already suggested the possibility of a coinfection of the two diseases.

Table 2. Physical Examination Results

Examination	Result
Head	No abnormality
Eyes	Anemic conjunctiva negative
Mouth	No abnormality
Neck	No abnormality
Heart	No abnormality
Lungs	Vesicular, rhonchi negative, wheezing negative
Liver	No abnormality
Abdomen	Bowel sound positive, tenderness positive
Kidney and bladder	No abnormality
Anus	No abnormality
Extremities	Warm acral, capillary refill time less than two seconds

Source: Primary data (2026)

The physical examination performed at the time of admission on 19 September 2026 showed that most organ systems were within normal limits. Examination of the head, mouth, neck, heart, liver, kidney and bladder, and anus revealed no abnormality, the eyes showed no anemic conjunctiva, and the lungs were vesicular with no rhonchi and no wheezing. The abdominal examination found positive bowel sounds with tenderness, which was in line with

the gastrointestinal complaints experienced by the patient such as nausea and vomiting. The extremities were warm with a capillary refill time of less than two seconds, indicating that the peripheral perfusion was still adequate and that there was no clinical sign of shock at the time of admission, which is consistent with the classification of dengue hemorrhagic fever grade 1.

Table 3. Vital Signs Examination

Parameter	Normal Value	19 Sept	20 Sept	21 Sept	22 Sept	23 Sept
Blood pressure	Equal to or below 120/80 mmHg	120/70	110/74	101/74	107/66	122/70
Pulse	60 to 100 per minute	88	84	60	56	53
Respiration	12 to 20 per minute	22	20	20	21	18
Temperature	36.5 to 37.5 C	39	38	35.7	36.1	36.8
GCS	Composmentis 14 to 15	15	15	15	15	15
Random blood glucose	Non DM below 100	92				

Source: Primary data (2026)

The vital sign monitoring from 19 to 23 September 2026 showed that the body temperature was highest on the first day of treatment at thirty nine degrees Celsius and gradually decreased until it returned to the normal range at thirty six point eight degrees Celsius on 23 September, which reflected the transition of the patient from the febrile phase toward the recovery phase. The blood pressure remained within normal limits throughout the treatment period, while the pulse rate tended to decrease from eighty eight to fifty three beats per minute and the respiratory rate remained within the normal range. The level of consciousness remained composmentis with a Glasgow Coma Scale of fifteen on every day of observation, and the random blood glucose measured on the first day was ninety two milligrams per deciliter, so that overall the vital signs showed a trend of clinical improvement in line with the decrease in body temperature.

Table 4. Clinical Condition of the Patient

Condition	19 Sept	20 Sept	21 Sept	22 Sept	23 Sept
Fever	Present	Present			
Headache	Present	Present	Present		
Nausea	Present				
Vomiting	Present				
Cough	Present				
Pain throughout the body	Present	Present	Present	Present	Present

Source: Primary data (2026)

The monitoring of the clinical condition showed that the main complaints experienced by the patient gradually improved during the treatment period. Fever, nausea, vomiting, and cough were present on the first day of treatment but were no longer found on the following days, and the headache that was still present until 21 September had resolved by 22 September. However, the complaint of pain throughout the body was still felt until the end of the observation period on 23 September, which indicated that the systemic symptoms of the infection had not completely resolved even though the fever and the gastrointestinal complaints had improved. This pattern of symptom improvement was consistent with the

favorable clinical course of the patient and supported the interpretation that the patient was entering the recovery phase of the disease.

Table 5. Clinical Pathology and Hematology Examination

Parameter	Normal Value	19 Sept	20 Sept	21 Sept	22 Sept	23 Sept
Hemoglobin	13 to 17 g/dL	17.4	17.0	17.7	17.6	17.4
Leukocyte	4 to 10 x10³/µL	3.66	3.05	6.29	8.98	6.54
Platelet	150 to 410 x10³/µL	119	43	25	31	73
Erythrocyte	4.5 to 5.5 x10⁶/µL	6.23	6.14	6.41	6.24	6.24
Hematocrit	40 to 50 %	51.1	48.8	51.9	49.5	49.8
MCH	27 to 32 pg	27.9	27.7	27.6	28.2	27.9
MCV	83 to 101 fL	82.0	79.5	81.0	79.3	79.8
MCHC	31.5 to 34.5 g/dL	34.1	34.8	34.0	35.6	34.9
RDW CV	11.5 to 14.5 %	11.9	11.6	12.9	12.0	12.1
RDW SD	35.0 to 47.0 fL	35.8	33.2	37.2	34.2	34.5
PDW	9.0 to 13.0 fL	10.0	11.8	16.8	13.7	16.0
MPV	7.2 to 11.1 fL	9.5	10.1	6.7	11.8	12.3
P LCR	15.0 to 25.0 %	20.3	24.8	23.5	38.6	41.5
Basophil	1 to 2 %	0.3	0.7	0.1	0.4	0.6
Eosinophil	1 to 6 %	0.5	0.0	3.8	2.8	3.8
Neutrophil	40 to 80 %	56.5	43.5	36.4	21.1	21.6
Lymphocyte	20 to 40 %	32.0	46.9	37.7	66.9	69.0
Monocyte	2 to 10 %	10.7	8.9	22.1	8.8	5.0
Neutrophil to lymphocyte ratio	Below 3.13	1.77	0.93	0.97	0.32	0.31
Anti *Salmonella* IgM	Reactive score above 4	Reactive score 6				
Dengue IgG	Nonreactive	Reactive				
NS1 antigen	Negative	Positive				
Dengue IgM	Nonreactive	Nonreactive				

Source: Primary data (2026)

The serial laboratory examination from 19 to 23 September 2026 showed hematological changes that supported a dengue infection. The platelet count decreased sharply from one hundred nineteen thousand per microliter on 19 September to its lowest value of twenty five thousand per microliter on 21 September before improving to seventy three thousand per microliter on 23 September, so that all results indicated thrombocytopenia that needed periodic monitoring because of its relationship with the risk of bleeding (Agnesia et al., 2023). The hematocrit was slightly elevated, with the highest value reaching the upper normal limit, but the increase from the initial value did not reach twenty percent, so that it could not yet be used as objective evidence of plasma leakage. The hemoglobin level was at the upper limit of normal and tended to show hemoconcentration when interpreted together with the hematocrit. The leukocyte count showed leukopenia during the first two days of

treatment and then returned to the normal range, while the differential count showed a decrease in the percentage of neutrophils and an increase in lymphocytes along with a decreasing neutrophil to lymphocyte ratio, all of which are hematological features that can be found during the course of dengue infection as the patient enters the late febrile phase and moves toward recovery. The immunology examination showed a positive NS1 antigen, a reactive dengue IgG, a nonreactive dengue IgM, and a reactive Anti *Salmonella* IgM with a score of six, which together supported the diagnosis of a coinfection of dengue and typhoid fever.

Table 6. Electrolyte Examination

Parameter	Normal Value	Result
Sodium (Na+)	135 to 145 mmol/L	137
Potassium (K+)	3.5 to 5.5 mmol/L	4.1
Chloride	97 to 107 mmol/L	106

Source: Primary data (2026)

The electrolyte examination during the treatment period showed that the sodium, potassium, and chloride levels were stable and remained within the normal range, with sodium at one hundred thirty seven millimoles per liter, potassium at four point one millimoles per liter, and chloride at one hundred six millimoles per liter on every examination. The stability of the electrolyte values indicated that the patient did not experience a significant electrolyte disturbance during treatment, which also reflected that the fluid therapy administered was adequate in maintaining the fluid and electrolyte balance. Maintaining a stable electrolyte status is important in dengue patients because the fluid shift related to the increased vascular permeability can affect the balance of body fluids and electrolytes.

Table 7. List of Drug Therapy

No	Drug or Infusion	Dose	19	20	21	22	23
1	IVFD Ringer Lactate	4 x 500 cc	✓	✓	✓	✓	✓
2	Ceftriaxone injection	2 x 1 g			✓	✓	✓
3	Omeprazole injection	1 x 40 mg	✓				
4	Paracetamol infusion	1 x 1 g	✓				
5	Ketorolac injection	1 x 30 mg	✓				
6	Ranitidine injection	2 x 50 mg	✓	✓	✓	✓	✓
7	Domperidone tablet	3 x 10 mg	✓	✓	✓	✓	✓
8	Paracetamol tablet	3 x 500 mg	✓	✓	✓	✓	✓
9	Antacid tablet	3 x 1	✓	✓	✓	✓	✓

Source: Primary data (2026)

The therapy received by the patient during treatment consisted of intravenous Ringer Lactate fluid, ceftriaxone injection, omeprazole injection, ranitidine injection, domperidone tablet, paracetamol in the form of infusion and tablet, ketorolac injection, and antacid tablet, which were given according to the clinical condition of the patient with a diagnosis of coinfection of dengue hemorrhagic fever grade 1 and typhoid fever. Ringer Lactate, ranitidine, domperidone, paracetamol tablet, and antacid were administered consistently throughout the treatment period, ceftriaxone was started on 21 September and continued until 23 September, while omeprazole, paracetamol infusion, and ketorolac were only given

once on the first day of treatment. The main principle of therapy in this patient was supportive treatment, particularly maintaining the fluid balance, controlling fever and pain, and managing the gastrointestinal complaints, together with antibiotic therapy directed at the suspected bacterial infection.

Table 8. Drug Selection Based on Indication

Problem	Drug Therapy	Dose	Indication
Fluid and electrolyte	Ringer Lactate	4 x 500 cc	First line rehydration fluid in dengue patients because it is isotonic and has a composition similar to plasma (Nasriyah, 2021)
Antibiotic	Ceftriaxone injection	2 x 1 g	A cephalosporin that inhibits peptidoglycan synthesis in the final stage of bacterial cell wall formation (Idrus et al., 2023)
Gastrointestinal	Antacid	3 x 1 tablet	Neutralizes the increased gastric acid in dengue patients who often have reduced appetite (Giska et al., 2014)
Gastrointestinal	Ranitidine	2 x 50 mg	Manages gastrointestinal symptoms and protects the gastric mucosa from the risk of bleeding (Rajapakse et al., 2014)
Gastrointestinal	Omeprazole	1 x 40 mg	Reduces gastric acid production to prevent gastric irritation and bleeding
Gastrointestinal	Domperidone	3 x 1 tablet	An antiemetic and prokinetic dopamine antagonist used to relieve nausea and vomiting
Symptomatic	Paracetamol infusion	1 x 1 g	Analgesic and antipyretic
Symptomatic	Paracetamol tablet	3 x 1 tablet	Analgesic and antipyretic
Symptomatic	Ketorolac injection	1 x 30 mg	Nonsteroidal antiinflammatory drug

Source: Primary data (2026)

The evaluation of drug selection showed that each drug given to the patient was in accordance with its indication. Ringer Lactate was used as the first line rehydration fluid in dengue because it is isotonic and has a composition similar to plasma (Nasriyah, 2021). Ceftriaxone was selected as the antibiotic because it is a cephalosporin that inhibits peptidoglycan synthesis in the final stage of bacterial cell wall formation and is appropriate for the suspected *Salmonella* infection (Idrus et al., 2023). Antacid was given to neutralize the increased gastric acid that often occurs in dengue patients with reduced appetite (Giska et al., 2014), while ranitidine was used to manage the gastrointestinal complaints and to protect the gastric mucosa from the risk of bleeding (Rajapakse et al., 2014). Omeprazole was used to reduce gastric acid production, domperidone was used as an antiemetic and prokinetic agent to relieve nausea and vomiting, and paracetamol was used as an analgesic and antipyretic, so that all drugs were appropriate to the clinical problems of the patient.

Table 9. Dose Appropriateness Evaluation

No	Drug or Infusion	Prescribed Dose	Literature Dose	Dose Calculation	Note
1	IVFD Ringer Lactate	500 ml per 6 hours	2700 ml	1500 + 20 x (BW minus 20) = 2700 ml	Appropriate dose
2	Ceftriaxone injection	2 x 1 g	1 to 2 g for 7 to 14 days		Appropriate dose
3	Omeprazole injection	1 x 40 mg	40 mg per day		Appropriate dose
4	Ranitidine injection	2 x 50 mg	50 mg every 6 to 8 hours		Appropriate dose
5	Paracetamol infusion	1 x 1 g	1 to 2 g IV every 24 hours		Appropriate dose
6	Ketorolac injection	1 x 30 mg	90 mg per day		Appropriate dose
7	Domperidone tablet	3 x 10 mg	30 mg per day		Appropriate dose
8	Paracetamol tablet	3 x 500 mg	4 g per day		Appropriate dose
9	Antacid tablet	3 x 1 tablet	3 to 4 tablets per day		Appropriate dose

Source: Primary data (2026)

The evaluation of the dosage showed that all drugs were given at doses appropriate to the needs of the patient. The requirement of Ringer Lactate was calculated based on the body weight of eighty kilograms and reached about two thousand seven hundred milliliters per day, so that the administration of four times five hundred milliliters per day needed to be evaluated and adjusted according to the clinical condition and the hydration status of the patient. The dose of ceftriaxone of two grams per day was within the therapeutic range used for typhoid fever, and the doses of omeprazole at forty milligrams per day, ranitidine at fifty milligrams every six to eight hours, domperidone at thirty milligrams per day, paracetamol tablet up to four grams per day, and antacid at three to four tablets per day were all within the recommended therapeutic ranges. Therefore, from the aspect of dosage, the therapy given to the patient was considered appropriate and did not show any drug related problem related to overdose or underdose.

Table 10. Drug and Disease Interaction

Drug	Disease	Level	Description
Ketorolac injection	Bleeding	Major	The use of ketorolac is contraindicated in patients with a suspected or confirmed high risk of bleeding. Ketorolac is a potent nonsteroidal antiinflammatory drug that reversibly inhibits platelet adhesion and aggregation and can prolong bleeding time, and thrombocytopenia has rarely been reported during its use.

Source: Primary data (2026)

The evaluation of drug and disease interactions identified one important interaction, namely the administration of ketorolac injection in a patient with dengue and thrombocytopenia. Ketorolac is a potent nonsteroidal antiinflammatory drug that reversibly inhibits platelet adhesion and aggregation and can prolong the bleeding time, and its use is

contraindicated in patients with a suspected or confirmed high risk of bleeding. In this patient the platelet count decreased progressively from one hundred nineteen thousand per microliter on 19 September to twenty five thousand per microliter on 21 September, so that the administration of ketorolac was categorized as a major drug and disease interaction that increased the risk of bleeding. This finding represented the main drug related problem in this case and became the focus of the pharmaceutical care evaluation.

Table 11. Potential Drug Side Effects

Drug	Potential Side Effect	Note
Ranitidine injection	Transient local burning or itching sensation	No side effect experienced
Paracetamol tablet	Nausea, diarrhea, cramps, or abdominal pain	No side effect experienced
Antacid tablet	Constipation, low blood phosphate, diarrhea, nausea, and vomiting	No side effect experienced
Ceftriaxone injection	Chest pain, shortness of breath, fever, and black stool	No side effect experienced
Ringer Lactate	Edema and fluid overload	No side effect experienced
Ketorolac injection	Nausea, diarrhea, dizziness, dyspepsia, and abdominal pain	No side effect experienced
Domperidone tablet	Dry mouth	No side effect experienced
Omeprazole injection	Headache, nausea, and diarrhea	No side effect experienced

Source: Primary data (2026)

The evaluation of potential drug side effects showed that although each drug given to the patient had the possibility of causing side effects, the patient did not experience any of them during the treatment period. Ranitidine could cause a transient local burning or itching sensation, paracetamol could cause nausea and abdominal discomfort, antacid could cause constipation or gastrointestinal disturbance, ceftriaxone could cause chest discomfort and other systemic reactions, Ringer Lactate could cause edema and fluid overload, ketorolac could cause nausea and gastrointestinal disturbance, domperidone could cause dry mouth, and omeprazole could cause headache and nausea. The absence of these side effects indicated that the therapy was well tolerated by the patient, although the monitoring of the potential side effects still needed to be carried out throughout the treatment, particularly the risk of bleeding associated with the use of ketorolac.

Table 12. Target of Patient Clinical Condition

Patient Condition	Target
Fever	Body temperature returns to normal
Headache	Headache reduced or resolved
Nausea	Nausea reduced
Vomiting	Frequency of vomiting reduced
Cough	Cough reduced
Pain throughout the body	Body pain reduced or resolved

The target of the clinical condition was established to monitor the improvement of the main complaints of the patient, namely the resolution of fever, the reduction or resolution of headache and body pain, and the reduction of nausea, vomiting, and cough, so that the achievement of these targets could be used as an indicator of the clinical response of the patient to the therapy given.

Table 13. Target of Vital Signs Examination

Parameter	Therapy Target
Blood pressure	Equal to or below 120/80 mmHg
Pulse	60 to 100 per minute
Respiration	12 to 20 per minute
Temperature	36.5 to 37.5 C
GCS	Composmentis 14 to 15
Random blood glucose	Non DM below 100

The target of the vital signs was the return of the blood pressure, the pulse, the respiration, and the body temperature to their normal ranges with a composmentis level of consciousness, which indicated the stabilization of the hemodynamic and general condition of the patient during the treatment period.

Table 14. Target of Laboratory Examination Results

Parameter	Normal Value
Hemoglobin	13 to 17 g/dL
Leukocyte	4 to 10 x10^3/µL
Platelet	150 to 410 x10^3/µL
Erythrocyte	4.5 to 5.5 x10^6/µL
Hematocrit	40 to 50 %
Neutrophil	40 to 80 %
Lymphocyte	20 to 40 %
Monocyte	2 to 10 %
Neutrophil to lymphocyte ratio	Below 3.13
Sodium (Na+)	135 to 145 mmol/L
Potassium (K+)	3.5 to 5.5 mmol/L
Chloride	97 to 107 mmol/L

The target of the laboratory results was the normalization of the hematological and electrolyte parameters, particularly the platelet count, the hematocrit, the hemoglobin, and the leukocyte count, so that the improvement of these parameters could be used as an objective indicator of the clinical improvement of the patient and as a basis for planning the continuation or adjustment of the therapy and the discharge of the patient.

Clinical Manifestation and Confirmation of the Coinfection Diagnosis

The clinical manifestations in this patient reflected the overlap between dengue hemorrhagic fever and typhoid fever. The acute fever accompanied by headache, retro orbital pain, and pain throughout the body corresponded to the typical presentation of acute dengue infection, whereas the fever together with nausea, vomiting, and other gastrointestinal complaints also supported the possibility of typhoid fever (Husna, 2023). Because the two diseases share overlapping features, the confirmation of the diagnosis could not rely on the clinical picture alone and required supporting laboratory and serological examinations.

The dengue infection in this patient was confirmed by a positive NS1 antigen, which is a nonstructural protein of the dengue virus that can be detected in the blood during the acute phase of infection, supported by a reactive dengue IgG and a nonreactive dengue IgM. The combination of a positive NS1 antigen, a reactive IgG, and a nonreactive IgM suggested the possibility of a secondary dengue infection, although the single reactive IgG result could not confirm a secondary infection with certainty because IgG can persist for a long time after a previous dengue infection. These serological findings were consistent with the hematological changes, namely the thrombocytopenia and the early leukopenia that are commonly found in dengue infection (Agnesia et al., 2023).

The typhoid fever in this patient was supported by a reactive Anti *Salmonella* IgM with a score of six, which exceeded the reactive threshold score of four, together with the clinical picture of fever and gastrointestinal complaints. However, the serological examination of Anti *Salmonella* IgM should not be used as the only basis for confirming typhoid fever because of its limitations in sensitivity and specificity, so that the result needed to be interpreted together with the clinical condition and the other supporting examinations. Based on the combination of the clinical manifestations, the hematological changes, and the serological results, the diagnosis of a coinfection of dengue hemorrhagic fever grade 1 and typhoid fever in this patient was adequately confirmed.

Evaluation of Pharmacotherapy and Drug Related Problems

The pharmacotherapy of the patient was directed at supportive therapy for the dengue infection, antibiotic therapy for the suspected *Salmonella* infection, and symptomatic therapy for the fever, pain, nausea, vomiting, and gastrointestinal complaints. The administration of Ringer Lactate aimed to maintain the intravascular volume and to prevent dehydration, particularly because the patient had experienced fever and repeated vomiting before admission, and it is one of the isotonic crystalloid fluids that can be used in dengue patients (Nasriyah, 2021). The administration of ceftriaxone at a dose of two grams per day was appropriate for the management of typhoid fever and needed to be monitored based on the clinical response of the patient, particularly the improvement of fever and systemic symptoms (Idrus et al., 2023).

Paracetamol was chosen as the analgesic and antipyretic because it does not inhibit platelet aggregation, so that it is more suitable for dengue patients than nonsteroidal antiinflammatory drugs, and its use was appropriate given the high fever and the complaints of headache and body pain. In contrast, the administration of ketorolac injection became an important concern because ketorolac is a nonsteroidal antiinflammatory drug that can inhibit platelet function and increase the risk of bleeding. In a patient with dengue and progressive thrombocytopenia, the use of ketorolac represented a drug related problem in the form of a drug and disease interaction, so that even though it was given only once, the use of this drug should be avoided and replaced with paracetamol, which had already been given to the patient.

From the perspective of pharmaceutical care, the role of the pharmacist in this case was not only to ensure the appropriateness of the indication and the dosage of the drugs but also to monitor the safety of the therapy, particularly the risk of bleeding associated with the use of nonsteroidal antiinflammatory drugs in dengue patients. The pharmacist needed to identify the risk of the use of ketorolac and to provide a recommendation to the medical team to consider an analgesic with a lower risk of bleeding. In addition, the pharmacist played a role in monitoring the platelet count, the hydration status, the body temperature, and the clinical response of the patient, as well as in providing education regarding the avoidance of aspirin and nonsteroidal antiinflammatory drugs and the recognition of the warning signs of bleeding, so that the therapy given could support the improvement of the condition and the safety of the patient.

CONCLUSION

Based on the assessment of the case of a nineteen year old male patient diagnosed with coinfection of dengue hemorrhagic fever grade 1 and typhoid fever, it can be concluded that the clinical condition of the patient showed manifestations consistent with both diseases, namely fever, chills, pain throughout the body, retro orbital pain, headache, nausea, and vomiting, which were supported by a positive dengue NS1 antigen, a reactive dengue IgG, a reactive Anti *Salmonella* IgM with a score of six, leukopenia at the beginning of treatment, and thrombocytopenia that reached its lowest value of twenty five thousand per microliter before improving to seventy three thousand per microliter at the end of observation, so that the coinfection was confirmed clinically and serologically, while the therapy consisting of Ringer Lactate fluid therapy, ceftriaxone as the antibiotic for the bacterial infection, paracetamol as an antipyretic and analgesic, and symptomatic therapy for the gastrointestinal complaints was generally appropriate in indication and dosage, although the administration of ketorolac in a dengue patient with thrombocytopenia represented a drug related problem in the form of a drug and disease interaction that increased the risk of bleeding, so that the pharmacist plays an important role in identifying this problem and recommending

paracetamol as the safer analgesic along with continuous monitoring of the platelet count, the hydration status, the body temperature, and the clinical response of the patient.

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