ORIGINAL ARTICLE

Dengue Haemorrhagic Fever. A Problem of Clinical Diagnosis and Proposal for Using a Scoring System

by

MUZIEF MUNIR, TJANDRA HUSADA and I. MUSTADJAB

(From the Department of Child Health, Gunung Wenang Hospital/ Medical Faculty, Sam Ratulangi University, Manado, Indonesia)

Abstract

This prospective study was conducted in an attempt to find out a method of clinical diagnosis of Dengue Haemorrhagic Fever with high accuracy and coverage. A clinical picture of all cases admitted with 3 days fever of unknown origin and positive tourniquet test was studied.

The cardinal signs and symptoms i.e. liver enlargement, thrombocyte count, hematocrit, spontaneous bleeding such as epistaxis, petechiae, hematoma and hematemesis, were thoroughly studied from the day of admission up to the sixth day of illness.

Blood was drawn into filter-paper disks for serologic examination on the day of admission, then 5, and 10 days thereafter.

Based on a series of serological tests, the patients were grouped into confirmed and false DHF.

Liver enlargement was found in both groups, but only in the confirmed DHF group was it significantly related to the day of illness ($r = 0.45$, with probably error of 0.03).

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Thrombocyte count, hematocrit of less than 45, and epistaxis were insignificantly different in both groups. But petechiae, melena, hematemesis and hematocrit of 45 or more, or with an increase of 5, and progressive enlargement of the liver, were frequently found in DHF.

From this study, a scoring system with the following interpretation is proposed :

A total score of : 0 — 3 : non DHF
4 — 6 : suspected DHF
more than 6 : definite DHF.

Introduction

During the last decade, DHF epidemic had occurred in various parts of Indonesia and at present almost all provinces have been infected by this serious disease, so that it has become an important public health problem of the country.

Dengue Shock Syndrome constitutes the one and only serious variant threatening the life of the patient.

It has been shown (Munir and Husada, 1978) that the mortality rate among DHF cases admitted without shock is lower than those admitted with DSS either by referral or non-referral. Thus it is of paramount importance that DHF patients be closely observed and if necessary hospitalized. This necessitates the identification of the disease in its early stage.

However, due to the unspecific symptoms and signs, it is very difficult indeed to arrive at the correct diagnosis. There are criteria (Nimmannitya, 1975; WHO, 1975; Sumarmo et al., 1975) which are usually used to diagnose DHF clinically and which are recommended to avoid over diagnosis that should be taken into consideration. It certainly would be very ideal if we were able to diagnosis DHF clinically as accurately as possible without over or under diagnosis.

The objective of this study is to analyse symptoms and signs of DHF relating to clinical diagnosis and to try to find out a combination of symptoms and signs which can be used as criteria in the clinical diagnosis of the disease.

Material and methods

All patients admitted to the Pediatric Department of Gunung Wenang General Hospital from January 1, 1976 up to October 31, 1979 with the diagnosis of DHF were subjected to this prospective study.

Generally they suffered from acute fever of unknown origin for an average of 1 - 2 days before admission, and showed a possitive Tourniquet test.

From the day of admission on, frequent daily examination and observations were made on: body temperature, bleeding manifestations (petechiae, ecchymosis, epistaxis or other bleeding tendencies), hepatomegaly, hematocrit, platelet count, etc.

Blood was drawn into filter-paper disks for serologic test; firstly on admission, then after 5 and 10 days. All these were noted on a prepared record sheet and were kept in each patient's file.

Based on the results of the serologic tests, an evaluation for the symptoms and signs was made. They were complied according to the day of illness, beginning from day 2 until day 6. The hematocrit was divided into 3 categories; less than 40, 40 - 45, and more than 45. The platelet count was grouped into higher or lower than 100.000/cml. Liver measurements were grouped into

0, 1 - 2, 2 - 4, 4 - 6, and more than 6 cm below the costal arch.

Spontaneous bleeding was grouped into petechiae or hematoma, epistaxis, gumbleeding, and haematemesis or melena.

A comparative study was made of serologic positive or confirmed DHF and the negative or false group at each similar day of illness.

Patients, admitted on the third day or later, those under 2 years of age and those who died within their six days of illness were excluded from this study.

Results

There were 74 cases in the confirmed DHF group and 63 in false DHF group with the sex distributions, mean age, and body weight shown in table 1.

TABLE 1 : *Sex distribution, mean age and body weight.*

Factors	Confirmed DHF Group	False DHF	Significancy
Male/Female	30/44	27/36	$p > 0.05$
Mean body Weight ± SD	20.70 ± 69	19.75 ± 5.4	$p > 0.5$
Mean age ± SD	87/12 ± 2.69	79/12 ± 2.9	$p > 0.05$

Table 2 shows the differences in percentages of the various liver measurements of the confirmed DHF group and false DHF group on the 2nd, 3rd, 4th, 5th and 6th day of illness.

On the second day of illness there was no difference in percentages of the various liver measurements between the confirmed DHF and false DHF groups.

On the contrary, an obvious difference was encountered in liver measurements on the 3rd day and beyond of illness between both groups.

Progressive liver enlargement was seen only in a confirmed DHF group, while in the false DHF group liver measurements were constant throughout the period of illness.

The liver measurements of 2 - 4 and 4 - 6 cm below the costal arch were commonly seen in confirmed DHF group, beginning on the third day of illness and beyond.

TABLE 2 : *Liver measurement in confirmed and false DHF group.*

Days of illness	DHF or false	Liver measurement below costal arch (in cm)						Total of both Groups
		0	1—2	3—4	4—6	6	Total	
2	DHF	26 (35%)	23 (31%)	22 (30%)	3 (4%)	—	74	137
	False	22 (35%)	26 (41%)	14 (23%)	1 (2%)		63	
3	DHF	21 (28%)	23 (30%)	24 (32%)	6 (8%)	—	74	137
	False	22 (35%)	26 (41%)	14 (22%)	1 (2%)		63	
4	DHF	10 (13%)	14 (19%)	30 (41%)	20 (28%)	—	74	137
	False	24 (35%)	24 (41%)	14 (18%)	1 (6%)		63	
5	DHF	9 (12%)	7 (9%)	29 (39%)	27 (36%)	2 (3%)	74	137
	False	24 (38%)	24 (38%)	14 (22%)	1 (2%)	—	63	
6	DHF	9 (12,2%)	4 (5,4%)	27 (36,5%)	30 (40,5%)	4 (5,4%)	74	137
	False	24 (38,1%)	22 (34,9%)	16 (25,4%)	1 (1,6%)	—	63	

r DHF = 0.425, with probable error of 0.0287.

r ..... 14. × probable error .....→ significant

r False = — 0.054 with probable error of 0.0350.

Probable error > r .....→ not significant.

Table 3 shows that the petechiae or haematoma were commonly seen in the confirmed DHF group, beginning on the second day up to 6 day of illness, while melena or haematemesis or gumbleeding were only found in the confirmed DHF group.

TABLE 3: *Types of spontaneous bleeding in relation to days of illness.*

		Petechiae Haematoma	Melena/ Hematemesis	Gumbleeding	Epistaxis	Total	Total of Both Groups
2	DHF	26 (35%)	1 (1%)	—	9 (12%)	36	52
	False	12 (19%)	—	—	4 (5%)	16	
3	DHF	30 (41%)	4 (5%)	1 (1%)	4 (5%)	39	57
	False	15 (24%)	—	—	3 (5%)	18	
4	DHF	35 (47%)	7 (9%)	1 (1%)	1 (1%)	44	61
	False	16 (25%)	—	—	1 (2%)	17	
5	DHF	35 (47%)	7 (9%)	1 (1%)	2 (3%)	45	56
	False	10 (16%)	—	—	1 (2%)	11	
6	DHF	34 (46%)	6 (8%)	—	—	40	48
	False	7 (11%)	—	—	1 (3%)	8	

Table 4 shows that thrombocytopenia with a thrombocyte count of 100.000/ cml, or less, was more commonly encountered in the confirmed DHF group, especially on the day 3, 4 and 5 of illness. However, thrombocytopenia was found only in 18 - 32% of the confirmed DHF.

TABLE 4: *Thrombocyte count in relation to days of illness.*

Days of illness		Thrombocyte count			
		⩽ 100.000	> 100.000	Total	p
2	DHF	13 (18%)	61 (82%)	74	$p > 0.05$
	False	5 (8%)	58 (92%)	63	
3	DHF	16 (22%)	58 (78%)	74	$p > 0.05$
	False	5 (8%)	58 (92%)	63	
4	DHF	22 (30%)	52 (70%)	74	$p < 0.05$
	False	4 (6%)	59 (94%)	63	
5	False	24 (32%)	50 (68%)	74	$p < 0.05$
	DHF	4 (6%)	59 (94%)	63	
6	False	14 (19%)	60 (81%)	74	$p < 0.05$
	DHF	4 (6%)	59 (94%)	63	

In table 5 it can be seen that there is no difference in the percentage of hematocrit of 40 or less, and 40 - 45 between both groups throughout the study. But hematocrit greater than 45 and an increase of 5 or more during the follow up were obviously different from the third day up to the 6th day of illness.

TABLE 5: *Hematocrit levels in relation to days of illness*

Days of illness	Cases	Hematocrit				
		⩽ 40	40 — 45	⩾ 45	Increase of 5	Total
2	DHF	50 (68%)	24 (32%)	—	—	74
	False	45 (65%)	28 (35%)	—	—	63
3	DHF	42 (57%)	25 (34%)	7 (9%)	2	74
	False	41 (65%)	22 (35%)	—	—	63
4	DHF	38 (52%)	24 (32%)	12 (16%)	10	74
	False	39 (62%)	24 (38%)	—	—	63
5	DHF	36 (48%)	22 (30%)	16 (22%)	15	74
	False	39 (62%)	24 (38%)	—	—	63
6	DHF	43 (58%)	25 (34%)	6 (8%)	1	74
	False	41 (65%)	22 (35%)	—	—	63

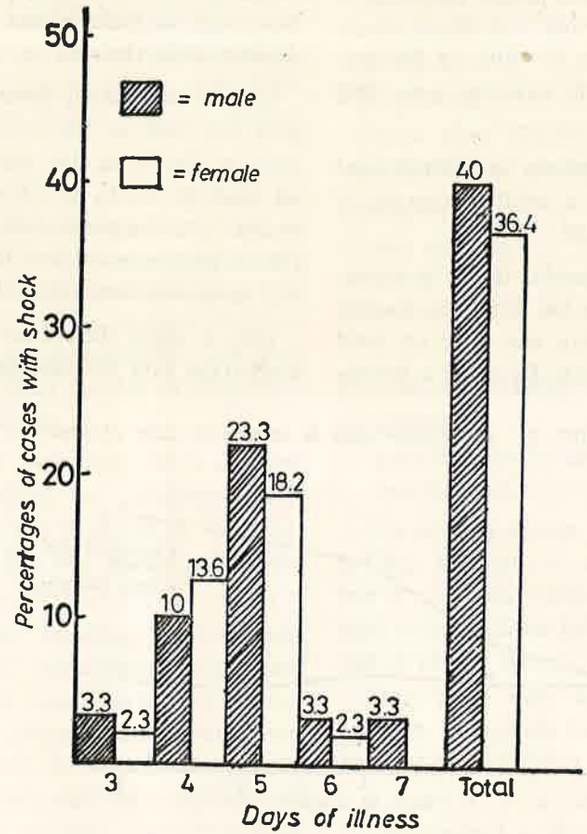
Discussion

The differences of sex, age and body weight between the study and the control group are not significant so that from a statistical point of view a comparison between them is valid.

Based on the fact that DSS mostly develops on the 4th and 5th day of illness (Munir and Husada 1978; Sumarmo et al., 1975; Tjandra and Munir, 1976) it was decided to compare the 2 groups only from day 2 until day 6.

A clinical diagnosis is significant only when made prior to the development of DSS, so that precautious measures can be undertaken.

FIG. 1: *Percentages of shock in relation to sex and days of illness*



Establishing a clinical diagnosis of DHF, especially during the early stage of illness is not quite easy.

It is brought about by the unspecific symptoms and signs which have also been documented by many investigators (Kho et al., 1972; Moeljono et al., 1975; Sunoto et al., 1975; Sumadmo et al., 1975; Tjandra and Munir, 1976). The symptoms and signs become more obvious as the disease progresses.

The alertness to a proper diagnosis of DHF on day 3, 4 and 5 of illness should be increased, since 30 - 50% of the confirmed DHF will develop into DSS (Figure 1) .

Applying the criteria commonly used would cover only a small percentage of the confirmed DHF.

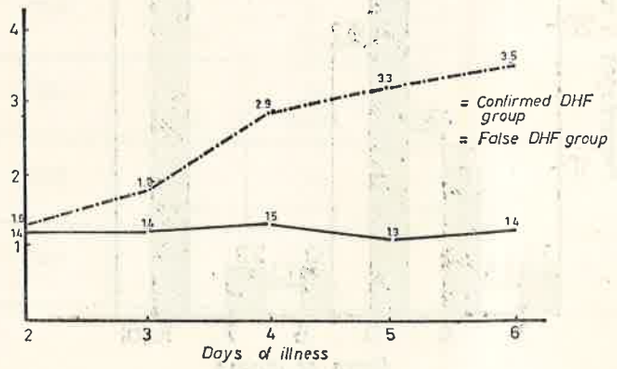
It would be harmful if the vast majority of cases are lost from the diagnosis, since more than one third of them developed into shock. By using a thrombocyte count of less than 100,000 as one of the criteria, only around 18 - 32% of the cases throughout the illness will be covered.

In spite of thrombocytopenia with the thrombocyte count of 100,000 or less, which was found not only in a confirmed DHF but also in false DHF group, the percentages of both groups throughout the days of study were significantly different. Thrombocytopenia may also be found in other bacterial, parasitic infection such as malaria and other viral diseases with viremia.

On the otherhand, fever and tourniquet test used as the criteria for diagnosis as shown in this study will cover all cases of DHF, but this method revealed over-diagnosis, 63 out of 137 (46%) were non DHF. Over-diagnosis will increase a demand for hospital beds.

Only a slight difference was encountered in the liver measurement, petechiae,

FIG. 2: *Mean liver sizes in relation to days of illness*



thrombocyte count and hematocrit on the second day of the illness between the 2 groups. However, an obvious difference began on the third day becoming more obvious on the 4th and 5th day of illness.

A great variation of liver measurement was one of the most important findings the study. But progressive enlargement was one of the most important findings in the confirmed DHF to support the clinical diagnosis of DHF. The mean liver sizes in confirmed DHF group increase by the increase of the day of illness up to 6 days, while in false DHF group they are almost constant. (Figure 2).

Hematocrit of 40 or less and 40 - 45 were not significant since there were no differences in percentage between the confirmed and the false DHF group. Hematocrit of 45 and an increase of hematocrit of 5, are determinants, but they cover only a small number of cases throughout the illness.

Increase of hematocrit of 5 or more occurred only in the confirmed DHF group on the day 3, 4 and 5, which coincides with the day of the occurrance of shock.

Spontaneous bleeding such as petechiae, melena, hematemesis and gum-bleeding were found mostly in a confirmed DHF group, while epistaxis was not so common. It is easily seen therefore in this study that the symptoms and signs are less specific, and vary from case to case. To avoid overdiagnosis or underdiagnosis, one should have a uniform method for the direction of the possibility of cardinal symptoms and signs.

Based on this study a scoring system was developed with items as follows :

Liver measurements :

— progressive enlargement of the liver	— 3
— 6 cm below the costal arch	— 3
— 4 - 6 cm below the costal arch	— 2
— 2 - 4 cm below the costal arch	— 1
— 2 cm or less below the costal arch	— 0

Thrombocyte :

— more than 100.000/mm^3	— 0
— 100.000/mm^3 or less	— 1

Hematocrit :

— less than 45	— 0
— 45 or more	— 2
— increase of 5 or more	— 2
— s h o c k	— 3

Spontaneous bleeding :

— epistaxis	— 0
— petechiae/hematoma	— 1
— hematemesis/melena	— 2

The scoring system did not only unify the method of clinical diagnosis, but it could also differentiate a confirmed with the false DHF on day 3, 4, 5 and 6 of the illness.

Thus it is very helpful in making an early diagnosis for the purpose of public health decision.

A score 0 - 3 : a false DHF, although it also covered a very small number of confirmed DHF.

A score 4 - 6 : suspected DHF.
6 or more : definite DHF.

A thorough and accurate daily examination for several consecutive days and the days of illness are the paramount important factors determining the achievement of the highest rate of accuracy of this scoring system.

It is very important to note that the higher the score, the higher the possibility of DHF will be, but the coverage become less.

The accuracy and the coverage will be increased by increasing the days of illness.

Due to geographical variation, racial factors, ecological condition, and many other factors which might influence the clinical picture of DHF, it is very important indeed to evaluate the effectiveness of this scoring system compared with the criteria commonly used. It is possible that the criteria properly used in one region might not necessarily be applicable in another.

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