

EXPERT SYSTEM FOR DIAGNOSING DENGUE FEVER

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ABSTRACT

This research is to design a prototype of expert system for diagnosing dengue fever based on the indication of disease, theory and expert knowledge). The result of the system includes all aspects of dengue fever. This prototype uses decision tree and decision table, which provide basic knowledge for questioning user to decide the disease and measures necessarily to be taken. This system is very useful for doctors, doctor candidates as well as students of medicine faculty who use it as a tool to start diagnosing a disease. The system has classified the disease structure based on basic information gathered from literature study and expert interview.

1. INTRODUCTION

Artificial intelligence computer based system is urgently needed in human life with the purpose to adopt identical to human capability in processing and thinking. In using the artificial intelligence information system, machine or system was designed and programmed to replace (substitute) the important role of human in finding solution, making decision, classifying, predicting and doing some other tasks identical to human intelligence[1]. Therefore, the program may help people to do the task or to solve problem since in some aspects it can replace the human role. The purpose is to increase the quality of human life by giving responsible for doing inefficient, time consuming, tiring or harmful jobs to the machine.

In the early 2006, the outbreak of dengue fever was very surprising, as many people have become victims. Dengue fever is a kind of disease caused by dengue virus spreading out through *Aedes Aegypti* and *Aedes Albopictus* mosquito. The two kinds of mosquito live in almost all areas in Indonesia with the places of 100 meter above the sea as an exception.

It happens very often that dengue fever is misjudged as other diseases like influenza and typhus. The reason is because dengue virus infection that leads to dengue fever can be asymptomatic or have unclear symptoms. Some symptoms of dengue fever are cough, flu, nausea, and diarrhea. The problem can be more serious when the virus infected the body together with other diseases like flu and typhus. Therefore, a better understanding about dengue virus infection, pathophysiology and clinical observation is required. When clinical symptoms of dengue fever are not sufficient to come to the decision, appropriate and comprehensive clinical check-up and supporting check-up (laboratory testing) may help to diagnose the disease.

The increasing number of dengue cases and the wider infected areas are caused by the improvement in public transportation, rapidly growth of new housing complex, lack of public awareness on cleaning mosquito's breeding places, spreading

out of mosquito vectors in almost all parts of area in Indonesia, and the existence of four types of virus cell circulating the whole year.

To solve the above-mentioned condition, it is necessary to create an expert system for diagnosing dengue fever. This system can manage the problem of the limited numbers of expert in giving preliminary diagnose, and the expert knowledge can reach more areas widely. Moreover, the expert knowledge and experience can be stored to help giving accurate and effective result of the disease.

2. DISCUSSION

2.1 Expert System Analysis

Knowledge and information required to develop the expert system were collected from some sources such as from experts and books about dengue fever disease. An expert is a person who has expertise in a certain field a person, who has knowledge or expertise, which commonly is not mastered or possessed, by other person. An expert is believed can give solution to problem which people in general are not able to do it or solve problem in a more efficient way [2]. It is therefore the scope of the discussion on dengue fever in this paper will not be much related to the expert knowledge.

In diagnosing several kinds of dengue fever, a doctor (or an expert) has to really understand the causes and the characteristics of dengue fever so that he is able come to accurate conclusion and he is able to determine how to cure the disease suffered by patient. As not all diseases can be concluded accurately by the expert system, this system is used as a tool to help diagnosing the early symptoms of dengue fever.

2.2 Expert System Design

In designing expert system, some factors have to be taken into considerations. These factors are among others knowledge acquisition, knowledge representation, decision table, decision tree, knowledge-based design, data design, and screen design.

2.3 Knowledge Acquisition

The first step of designing the expert system is the process of knowledge acquisition from experts. Experts in this case are internists in Siloam Hospital, West Jakarta. In this process, internists were interviewed on how to diagnose dengue fever and other kinds of diseases based on the symptoms on and complaints from patients. The diagnosing was made similar to diagnosing line of an expert, and recommendation on literature about diseases in stomach from experts is also provided.

3. IMPLEMENTATION AND EVALUATION

3.1 Implementation

This prototype has four main screens: opening screen, patient data screen, question screen, which consists of 25-question screen, and result screen. The implementation of ... interface and the example case of a patient infected by dengue fever can be seen below.

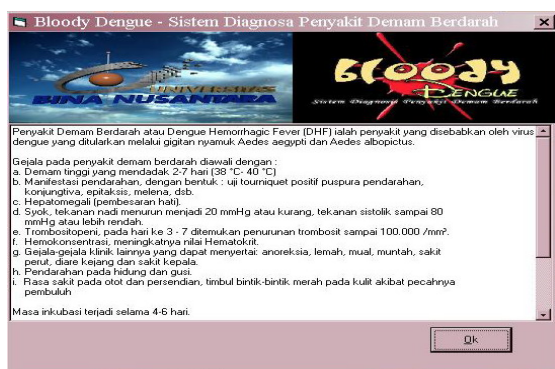


Figure 1. Screen Opening



Figure 2. Screen Pasien Data



Figure 3. Screen Question 1



Figure 4. Screen Question 2

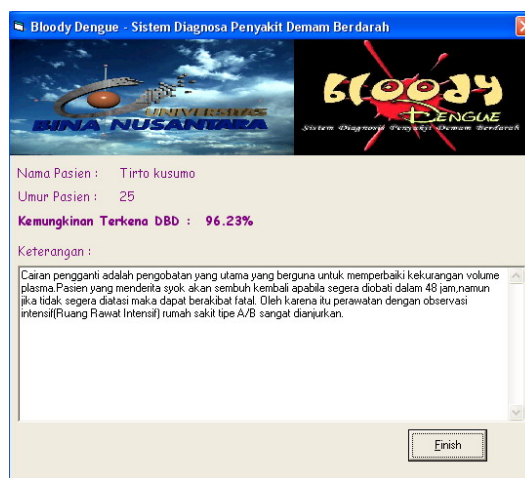


Figure 5. Screen Result

3.2 Evaluation

From comprehensive evaluation on how the system works, it can be said that the expert system for diagnosing dengue fever disease has worked well as after testing on some cases, this expert system has been able to provide the diagnose in quantitative result. It is proven that knowledge base and certainty factor in this system can be applied in searching for and diagnosing possibility of being infected by dengue fever. The diagnose result of this system is represented in quantitative form while the diagnose result of experts provides the conclusion of yes or no only. It can be concluded that experts try to avoid the risk of misjudgment for being in doubt whether the patient really gets the dengue fever or not, while the system can give information about the degree of certainty that a patient is infected by dengue fever.

4. CONCLUSION

From the evaluation on the use of the expert system to diagnose dengue fever, it can be concluded that

- a. The expert system prototype, which covered various aspects of dengue fever disease, has been completely designed. The rules have been developed in accordance with the expert system. The expert system prototype was designed with

user-friendly characteristics (can be easily operated by user).

- b. The expert system prototype has used decision tree and decision table as a knowledge base in asking questions to patient to find out about the possibility of being infected by dengue fever and the next measures necessarily to be taken.
- c. There is still a possibility that the diagnose result from the expert system has low certainty factor. It is caused by two factors: different perception between the set of questions and answers provided by the expert system and the conditions of symptoms described by user; and the possibility that the symptoms the user has are different from the characteristics of the disease in general.
- d. The expert system for diagnosing dengue fever can be used by medical doctors as a tool to help giving early diagnose or second diagnose. This system can also be used by students of medical faculty to get better understanding on dengue fever disease more easily as this system has classified the dengue fever structurally based on the information collected from literature study and from experts.

Some suggestions in developing this expert system to make it more useful and effective in diagnosing dengue fever are:

- a. To add rules and new rules about dengue fever on knowledge base.
- b. It would be better to add the laboratory result on blood testing in the tree structure of dengue fever diagnosing to make it more accurate in diagnosing and giving high certainty factor.
- c. To make the scope of discussion on various diseases with symptoms similar to dengue fever wider for comparison and information.

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