IMPLEMENTATION OF CERTAINTY FACTOR METHOD TO IDENTIFY GASTROESOPHAGEAL REFLUX DISEASE (GERD)

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Abstract

Background : Gestroesophageal Reflux Disease (GERD) is a type of disease that is often experienced by the community, and this type of disease is a disease that has the highest number of patients at the Sidodadi Health Center. Sidodadi Health Center is a community health service center located in Sidodadi District, which is located on JL. Ir. Sutami, Sidodadi, Kec. Kisaran Barat City, Asahan Regency, North Sumatra 21211. In this case why GERD is a type of disease that has more patients than other diseases at the Sidodadi Health Center because there are still many people who pay less attention to disorders and causes and symptoms that occur in gastric disease. **Method :** In building an expert system, several methods can be used, including Certainty Factor, Backward Chaining and Certainty Factor. The Certainty Factor method is one of the two main methods of reasoning when using an inference engine and can logically be described as a repeated application of the modus ponens (a set of inference rules and valid arguments). **Results :** The results of this study can later provide the best solution to assist the Sidodadi Health Center in identifying Gastroesophageal Reflux Disease (GERD). **Conclusion :** This system is made dynamic so that if there are changes or additions to Gestroesophageal Reflux Disease (GERD) or symptoms, it can be done easily.

Keywords: Expert System, Certainty Factor, Gastroesophageal Reflux Disease
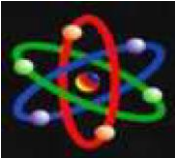
INTRODUCTION

Entering the industrial revolution 4.0 which is entirely integrated with the internet, of course, information technology today has been used as something difficult to be separated from the needs of some and even all mankind in the world. Currently, the trend of computerization is experiencing rapid development, the overall cost of using tools in the health sector that also follow the development must be adjusted, and improvements in efficiency and service quality will always be used as an important aspect to increasing competitiveness in the world of health.

Health is important for all humans because, without good health, every human being will find it difficult to carry out their daily activities. Health is a symptom where the condition of the body and soul is in a productive condition both in terms of mental, physical, social and economic, whereas health is a body condition that is very important in carrying out activities in daily life. Without a healthy body state, it will hinder activities in life both spiritually and physically. Body health plays an important role in life, if we cannot maintain the health of our body properly then our body will be easily attacked by various diseases.

Gestroesophageal Reflux Disease (GERD) is a type of disease that is often experienced by the community, and this type of disease is the disease that has the largest number of patients at the Sidodadi Health Center. Puskesmas Sidodadi is a community health service centre located in Sidodadi District, which is located on Ir. Sutami Street, Sidodadi, West Range City District, Asahan Regency, North Sumatera 21211. In this case, why GERD disease is a type of disease that has more patients than other diseases at the Sidodadi Health Center because there are still many people who do not pay attention to the disorders and causes and symptoms that occur in gastric diseases.

This causes many people to experience gastric disease disorders to a stage that is already serious and even difficult to cure, this happens because of the lack of attention to the initial symptoms of gastric disease. Along with the rapid development of technology and information systems, computers are used and utilized as a medium to provide information and improve the performance of human knowledge.

One of the fields that have been utilized by information technology is by creating an Expert System program application to Identify diseases in the stomach which is devoted to detecting Gastroesophageal Reflux Disease (GERD) at the Sidodadi Health Center through symptoms or complaints experienced by the community so that a diagnosis of the disease that is being experienced can be obtained before going to a more serious stage. One of the areas that can be utilized in this case is the Expert System.

The expert system is one part of artificial intelligence (artificial intelligence). This system is designed to mimic the expertise of an expert system in answering questions and solving problems in the fields of health, medicine, business, economics and so on. The basic concepts of an expert system contain several
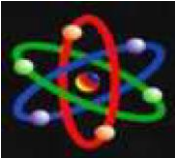
elements, including expertise, experts, transfer of expertise, inference and rules of ability to explain [1].

The implementation of expert systems in the field of health is widely used because expert systems are seen as a means to store expert knowledge on computer programs. Expert systems result in faster and more consistent decisions [2]. The implementation applied in the health sector is an expert system for diagnosing a disease. The expert system can help the activities of experts as assistants who are experienced and have the knowledge needed [3]. In the preparation of the expert system, a combination of inference rules with a certain knowledge base is carried out by one or more experts in a certain field [4] [5].

In building an expert system, you can use several methods, including Certainty Factor, Backward Chaining and Certainty Factor. The Certainty Factor method is one of the two main methods of reasoning when using the inference engine and can be logically described as a repetition application of the ponens mode (a set of inference rules and valid arguments) [6].

RESEARCH METHODS

The research method used is quantitative research, which is research that uses data in the form of numbers processed using formulas to obtain results based on calculations with these formulas. The purpose of this research method is to describe the object under study, namely diagnosing Gastroesophageal Reflux Disease (Gerd) with the Certainty Factor method. Mathematical equations of the Certainty Factor method [7]:

$$CF[h,e] = MB[h,e] - MD[h,e] \quad (1)$$

Where:

$CF[h,e]$ = certainty factor

$MB[h,e]$ = measure of belief, a measure of confidence or degree of confidence in the hypothesis (h), if given evidence € between 0 and 1

$MD[h,e]$ = measure of disbelief, a measure of distrust or degree of confidence in the hypothesis (h), if given evidence € between 0 and 1.

RESULTS AND DISCUSSION

The decision formula obtained from the use of the certainty factor method is obtained, and the results of the statement on the decision tree are obtained as follows [8]:

| No	Code	Symptom Name	GERD Disease Code
1	G003	Do you experience pain or soreness in the stomach?	(D1) Disease Gastritis
2	G013	Do you have a reduced appetite?	
3	G002	Do you have flatulence?	(D2) Disease Dispepsia
4	G06	Do you experience nausea?	
5	G004	Are you experiencing weight loss?	(D3) Disease Gastric Cancer
6	G007	Do you experience black pups?	
7	G005	Do you experience the taste of food again?	(D4) Disease Gred
8	G010	Do you experience pain in the bowels of	
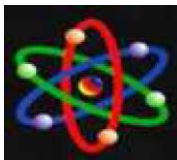
		the liver?	
9	G008	Do you have a fever?	(D5) Disease Gastroenteritis
10	G011	Do you have abdominal spasms	
11	G001	Do you experience liquid pups?	
12	G009	Do you experience feelings of excessive satiety	(D6) Peptic Ulcer Disease
13	G012	Do you experience pain in a stomach ulcer	

Table 1. Decision Table

Decision Tree
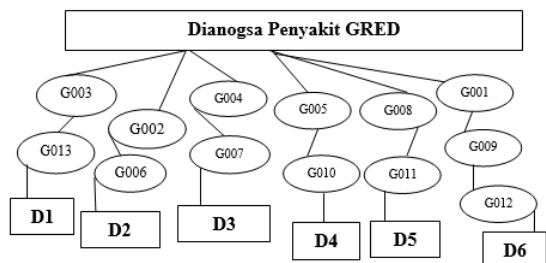
Figure 1. Tree Decision Diagnosis of Gestroesophageal Reflux Disease (GERD)

CFcombine $CF[H,E]1,2 = CF[H,E]1 + CF[H,E]2 * (1-CF[H,E]1]$

No	Code	Answer				Patient weights
		Certainly	Don't know	Maybe	Very doubtful	
1	G01		✓			0.2
2	G02			✓		0.4
3	G03				✓	0.6
6	G04	✓				0.8
7	G05	✓				0.8

Table 2. List of Question dan Patient Answers

Code	The Value of Certainty	Weight User
G1	0.4	0.2
G2	0.6	0.4
G3	0.8	0.6
G4	0.6	0.8
G5	0.4	0.8

Table 3. The Value of Certainty and Weight User

Calculated its CF value by multiplying the expert's CF by the user's CF into:

$CF[H,E]1 = CF[H]1 * CF[E]1$

$= 0.4 * 0.2$

$= 0.08$

$CF[H,E]2 = CF[H]2 * CF[E]2$

$= 0.6 * 0.4$

$= 0.24$

$CF[H,E]3 = CF[H]3 * CF[E]3$

$= 0.8 * 0.6$

$= 0.48$

$CF[H,E]4 = CF[H]4 * CF[E]4$

$= 0.6 * 0.8$
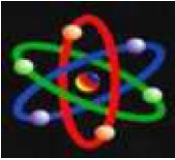
$= 0.48$

$CF[H,E]5 = CF[H]5 * CF[E]5$

$= 0.4 * 0.8$

$= 0.32$

Next look for the value of starch between the combinations. Here's a combination of what you get:

CFcombine $CF[H,E]1,2 = CF[H,E]1 + CF[H,E]2 * (1-CF[H,E]1]$

$= 0.08 + 0.24 * (1-0.08)$

$= 0.08 + 0.24 * 0.92$

$= 0.3008$ old1

CFcombine $CF[H,E]old,3 = CF[H,E]old1 + CF[H,E]3 * (1- CF[H,E]old1]$

$= 0.3008 + 0.48 * (1-0.3008)$

$= 0.3008 + 0.48 * 06992$

$= 0.6364$ old2

CFcombine $CF[H,E]old2,4 = CF[H,E]old2 + CF[H,E]4 * (1-CF[H,E]old2]$

$= 0.6364 + 0.48 * (1-0.6364)$

$= 0.6364 + 0.48 * 0.3636$

$= 0.8109$ old3

CFcombine $CF[H,E]old3,5 = CF[H,E]old3 + CF[H,E]5 * (1-CF[H,E]old3]$

$= 0.8109 + 0.32 * (1-0.8109)$

$= 0.8109 + 0.32 * 0.1891$

$= 0.8714$ old4

CFcombine $CF[H,E]0ld4.6 = CF[H,E]old4 + CF[H,E]6 * (1-CF[H,E]old4]$

$CF[H,E]old6 * 100\%   = 0.81 * 100\%$

$= 81\%$

From the calculation results above, it can be seen that the confidence level of the diagnosis results is 81%.

CONCLUSION

Several things can be concluded in the diagnosis of Gestroesophageal Reflux Disease (GERD) experienced by the community and patients at the Sidodadi Health Center using the Certainty Factor method, namely as follows:

1. This expert system can provide diagnostic results of the symptoms that have been entered by the user.

2. This expert system can classify Gestroesophageal Reflux Disease (GERD) and its treatment.

3. This system is made dynamic so that if there are changes or additions to Gestroesophageal Reflux Disease (GERD) or symptoms can be done easily.

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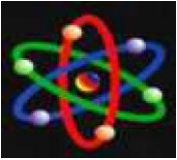
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