



## Expert System for Detecting Early Symptoms of *Gastroesophageal Reflux Disease (GERD)* method *Case Based Reasoning (CBR)* Using Mobile Android

Rima Tamara Aldisa

Informatika, Fakultas Teknologi Komunikasi Dan Informatika(FTKI), Universitas Nasional, Pasar Minggu, Jakarta, Indonesia

E-mail: [rimatamaraa@gmail.com](mailto:rimatamaraa@gmail.com)

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### ABSTRACT

GERD is a chronic disease that occurs when stomach acid or bile flows into the food tract and irritates its inner walls. Acid reflux and heartburn. Symptoms include heartburn that usually occurs after eating and worsens when lying down. In designing this expert system is an application used to detect GERD disease. The process of helping detect begins with the way the user answers the questions in the form of symptoms suffered by the user. This expert system is based on Android so that it can be accessed anytime and anywhere by the user and this system is built using the Java Android programming language. The conclusions that can be obtained from the results of this study include the blackbox test results showing the features of the application that are made running. An expert system application designed to be able to help detect GERD based on the symptoms entered by the user.

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## 1. Introduction

GERD (gastroesophageal reflux disease) or acid reflux disease is caused by weakening of the valve or sphincter that is located in the lower esophagus. Normally, this valve will open to allow food and drink to enter the stomach and be digested. After food or drink enters the stomach, this valve will close tightly to prevent stomach contents from rising back into the esophagus.

In this study on GERD, there are symptoms of a sour mouth and heartburn, difficulty swallowing or a feeling like a lump in the throat, respiratory problems, such as coughing and shortness of breath. People who have asthma will often relapse when GERD symptoms recur, Hoarseness, Nausea and vomiting, Sore throat, Unconscious gastric contents, Sleep disturbances, Tooth decay due to frequent exposure to stomach acid, Bad breath.

So that the resulting expert system application can really be used by ordinary people. In this study, the expert system application was made on a mobile basis with the platform used was Android. Applications are made on a mobile basis so that applications can be used anytime and anywhere.

## 2. Literature review

### 2.1 Gastroesophageal reflux disease (GERD)

Gastroesophageal reflux disease (GERD) is a digestive disorder characterized by repeated long-term reflux of gastric acid. Acid reflux is a condition that occurs when acidic fluid in the stomach leaks and flows back up into the esophagus (esophagus). Acid reflux can erode and irritate the lining in the esophagus. As a result, there is a sensation of pain and heat as if burning in the gut and throat (heartburn), and a sour taste in the mouth.

### 2.2 Expert System

An expert system is a system that tries to adopt human knowledge to a computer, so that computers can solve problems as is usually done by experts, and a good expert system is designed to solve certain problems by imitating the work of experts. (Kusumadewi, 2003: 109)



**2.3 Case Based Reasoning**

Case Based Reasoning is a method for solving problems by remembering similar events that have happened in the past and then using that knowledge / information to solve new problems, or in other words, solve problems by facing different solutions. used in the past:

Weight parameter (w):

Important symptom = 5

Medium salary = 3

Usual salary = 1

$$S1*W1+ S2*W2+....+ Sn*WnW1+W2 +....+Wn$$

Information :

Similarity = (similarity value), namely 1 (same) and 0 (different)

W = weight (given weight)

**2.4 Blackbox Testing**

Black Box Testing is a test that is carried out only to observe the results of execution in the software. Observation of these results through test data from the software itself. Black box testing evaluates only on the outward appearance (interface).

**3. Analysis and Design**

**3.1 Analysis**

The analysis stage of a system is carried out before the design stage is carried out. The purpose of implementing an analysis of a system is to find out the reasons why the system is needed, so that the functions contained in the system work optimally. In this stage, a search and collection of data and knowledge obtained by the expert system is carried out.

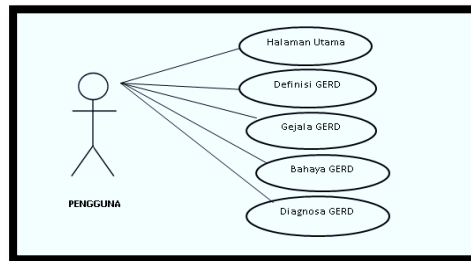
**3.2 Desain Sistem**

This system that will be proposed is to create an Expert System that can be used to diagnose GERD based on Android Mobile.

**3.3 Use Case Diagram**

Use Case Diagrams are created to describe the functional model of a system that uses actors and use cases. The following is a Use Case Diagram for an expert system to diagnose GERD.

Can be seen in Fig 1 below:



**Fig 1** Use Case Diagram

**Tabel 1**  
Description Use Case Diagram

No	Actor	Deskripsi
1	Halaman Utama	Pengguna membuka aplikasi kemudian akan muncul menu/halaman utama
2	Definisi GERD	Pengguna membuka aplikasi kemudian akan muncul Definisi , Apa itu penyakit GERD yang harus kita ketahui
3	Gejala GERD	Pengguna membuka aplikasi kemudian akan muncul Gejala-gejala awal yang muncul dari penyakit GERD yang harus kita pahami
4	Bahaya GERD	Pengguna membuka aplikasi kemudian akan muncul Bahaya GERD yang timbul jika kita tidak cepat tanggap
5	Diganosa GERD	Pengguna membuka aplikasi kemudian akan muncul halaman Diagnosa GERD



### 3.4 Activity Diagram Disease Diagnosis

Activity diagram of disease diagnosis is an activity performed by the user to diagnose illness that is being suffered. It can be seen from Fig 2 below:

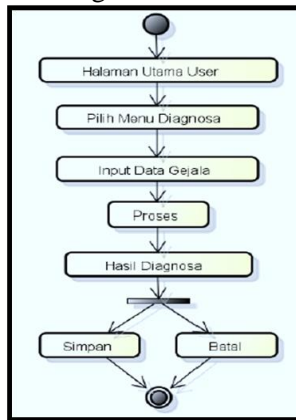


Fig 2 Activity Diagram Disease Diagnosis

### 3.5 Design the system

#### a. Initial View of the GERD Expert System



Fig 3 Home Menu Display

The display in this initial menu contains What is GERD, GERD Symptoms, GERD Diagnosis, Tips for maintaining gastric health, GERD Dangers, About, GERD Examination, How to Overcome, Differences in GERD symptoms for children and adults.

**b. GERD Symptoms**



**Fig 4** GERD Symptoms

In this menu display, there are the main symptoms of GERD that we should know and be aware

**c. How to deal with GERD**



**Fig 5** How to deal with GERD

In the menu how to deal with GERD, there are types of drugs that may be suitable appropriate to use to treat GERD. If it drags on, you can consult a specialist.

#### d. GERD Diagnosis



**Fig 6** GERD Diagnosis

In the display in the GERD diagnosis menu, there are various kinds of disease symptoms that are inputted by the User

#### 4. Conclusion

After studying, analyzing, designing and implementing and testing the Expert System using *the Case Based Reasoning Method*, we can draw the following conclusions:

- This expert system aims to help diagnose acute and chronic GERD for both children under five and adults based on Mobile Android.
- Calculations in the expert system to make an initial diagnosis of GERD using the CBR (Case Based Reasoning) method as a guide to solving problems to overcome the length of time and the high cost of the consultation.
- The GERD Disease Diagnosis Expert System that was built to provide information easily and quickly starting from symptoms, diseases and solutions only in consultation with this system without having to rely on a specialist in digestive / gastric diseases.

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