# KIDNEY DISEASE DIAGNOSIS IN HUMAN USING THE BACKWARD CHAINING METHOD

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ABSTRACT

*Kidney disease is a disease that must be avoided by everyone. Because this disease is difficult to detect and often threatens a person's life. The problem that often occurs is that the kidneys are not functioning properly, so the body does not try to reject enough water, salt, and other materials that can cause death unless the treatment is analyzed. An accurate analytical ability is needed in determining the diagnosis of a person's kidney condition. But with the convenience of expert doctors, sometimes there are also disadvantages such as limited working hours (training) and the number of patients so they have to wait in line. The backward chaining method is an inference method that performs the search process starting from the goal, which is the conclusion of the solution to the problem at hand. Stages that must be done is to find a set of data or facts, from the facts sought conclusions that are the solution of the problem at hand. The system can be run if the user chooses a disease and chooses the symptoms that are felt and then gets a diagnosis and a solution, and medication.*

**Keywords:** *Disease Diagnosis, Expert System, Users, Backward Chaining.*

## I INTRODUCTION

Kidney disease is a disease that must be avoided by everyone. Because the disease is difficult to detect and often threatens a person's life. Kidney disease is known as a 'silent disease' because there are often no warning signs. If not detected, it will only worsen the condition from time to time. A more chronic form of kidney disease is progressive loss of kidney function in the body over a period of months or years. Often, this disease is only diagnosed from screening to find out which level is at high risk of kidney disease.

The problem that often occurs is that the kidneys are not functioning properly, so the body does not try to reject water, salt, and other materials sufficiently which can result in death unless analytical treatment is carried out. Thus the ability of accurate analysis is needed in determining the diagnosis of a person's kidney condition. But with the ease of having an expert doctor, sometimes there are also weaknesses such as limited working hours (practice) and the number of patients so they have to wait in line. For this we need an expert system that is used to diagnose early kidney disease so that it helps the user in identifying health problems. One that is used to diagnose kidney disease in humans is the backward chaining method.

The backward chaining method is an inference method that starts the search process starting from the goal, which is the conclusion that becomes the solution to the problem at hand. Stages that must be done is to look for a set of data or facts, from these facts a conclusion is sought to be the solution of the problem at hand.

Based on the description above to support the application of the backward chaining method, an application is made that can determine a problem in kidney disease in humans. In order to realize this, the research title was raised "***Diagnosis of Kidney Disease in Humans Using the Backward Chaining Method***".

## II. BASIC THEORY

### 2.1 Expert System

Expert System (in English is an expert system) is an information system that contains knowledge from experts so that it can be used for consultation. Knowledge from experts in this system is used as a basis by the Expert System to answer questions (consultation).

Expertise (expertise) is extensive and specific knowledge gained through a series of training, reading, and experience. Knowledge makes experts able to make decisions better and faster than non-experts in solving complex problems. Expertise has a tiered nature, top experts have more knowledge than junior experts. The purpose of an expert system is to transfer expertise from an expert to a computer, then to another person (who is not an expert). [1]

### 2.2 Backward Chaining Method

Backward chaining is a search strategy whose direction is opposite of the forward chaining. The fact or statement experiment starts from the right hand side (THEN first). In other words, reasoning starts from the hypothesis first and to test the truth of the hypothesis must be sought facts - facts that exist in the knowledge base. The search process starts from the goal, the conclusion is the solution to be achieved, then from the rules obtained, each conclusion Backward Chaining path that leads to the conclusion is the solution sought, if it is not appropriate then the conclusion is not the solution sought. Backward Chaining starts the search process with a goal so that this strategy is also called goal-driven.

## III. SYSTEM ANALYSIS AND SYSTEM DESIGN

### 3.1 Analysis

Before determining the existing problems, it is necessary to conduct an analysis or observation with priority problems that exist and to determine how the right solution to solve the problem. In the system analysis, will learn how the processes that occur when the system works.

### 3.2 Problem Analysis

Stages of this analysis to diagnose a disease need to know in advance the symptoms caused. Although only from clinical symptoms (symptoms that are seen directly or felt directly by the patient), it is necessary to take the right steps to recognize and know the symptoms of diseases that exist in humans quickly and precisely.

For this we need an expert system that is used to diagnose early kidney disease. So it helps users in identifying health problems by using backward chaining methods that can provide diagnostic information and provide solutions for how to handle it appropriately.

### 3.3 System Data Analysis

At the writing of this thesis, the data used are data obtained during the data collection process consisting of disease data, and symptom data. These data were obtained from interviews and books relating to Kidney Disease.

### 3.4 System Design Flow Chart

At this stage a little picture of the Kidney Disease Diagnosis program which will be developed in the next chapter.

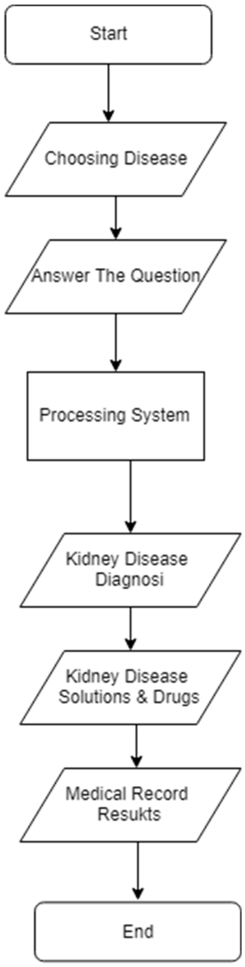


*Figure 3.1 System Flowchart (Program)*

For system design applications in accordance with the flowchart. Rule determines what symptoms enter into the disease as a reinforcement of the diagnosis.

**3.5 DFD Level 0**

DFD Level 0 is describing a diagram that can represent all the processes contained in a system. DFD level 0 of the system used in this Final Project is described as follows:

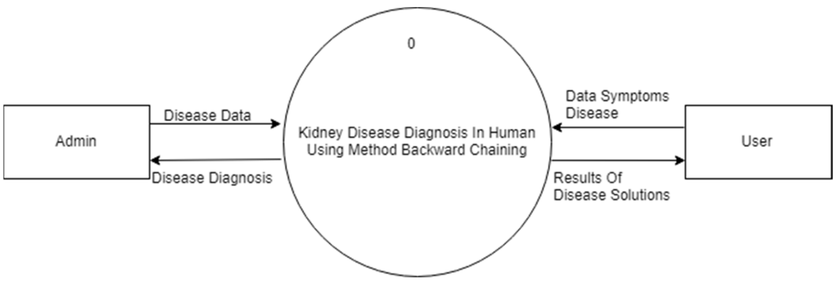


*Figure 3.2 DFD level 0*

**3.5.1 DFD Level 1**

DFD level 1 is the second process of the flow of a system. DFD level 1 is a modelling tool that allows system professionals to describe the system as a network of functional processes that are connected to each other by data flow, both manually and computerized. DFD level 1 of the system used in this Final Project is described as follows:

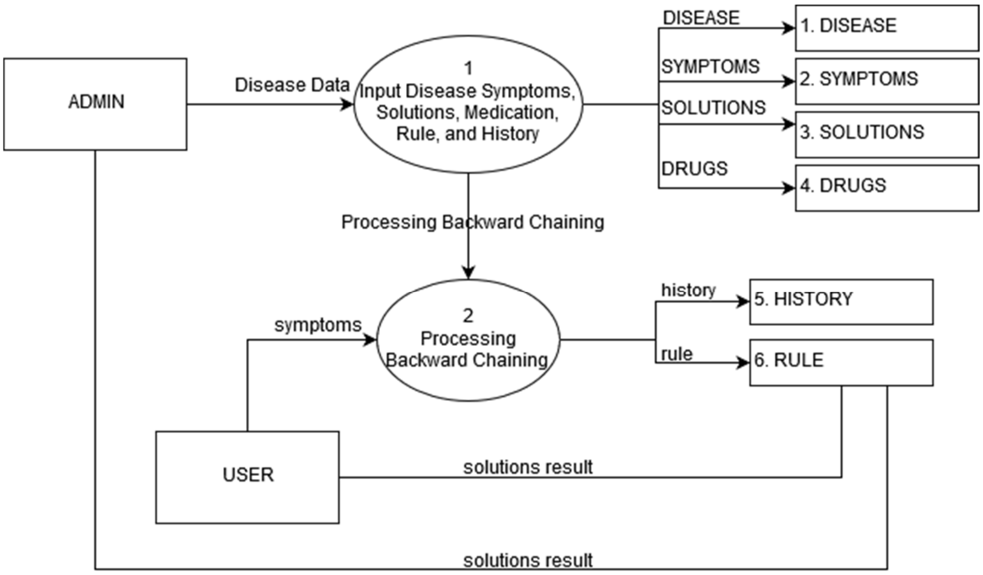


*Figure 3.3 DFD Level 1*

**3.6 Entity Relationship Diagram (ERD)**

ERD (Entity Relationship Diagram) is the main data modelling that organizes data in a project into entities and determines relationships between entities.

ERD is also a model to explain a relationship between data in a database based on data base objects that have relationships between relations. ERD models data structures and relationships between data, and to illustrate it uses notations and symbols.

The design of ERD in this case explains the relations between attributes, following relations from the following table:

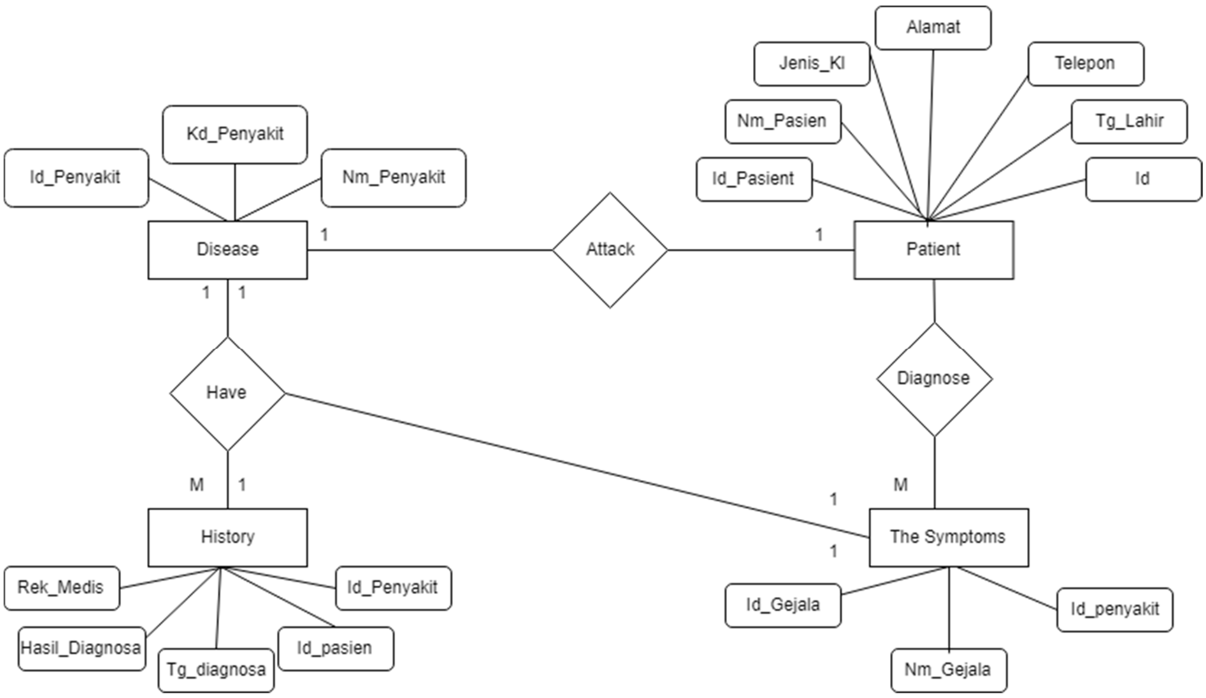


*Figure 3.5 ERD diagram*

### 3.7 Data Relationship Model (MDR)

Data Relationship Model (MDR) is a collection of tables with two dimensions arranged by rows (tuples) and columns (attributes) in a database file. The following table can be seen below:

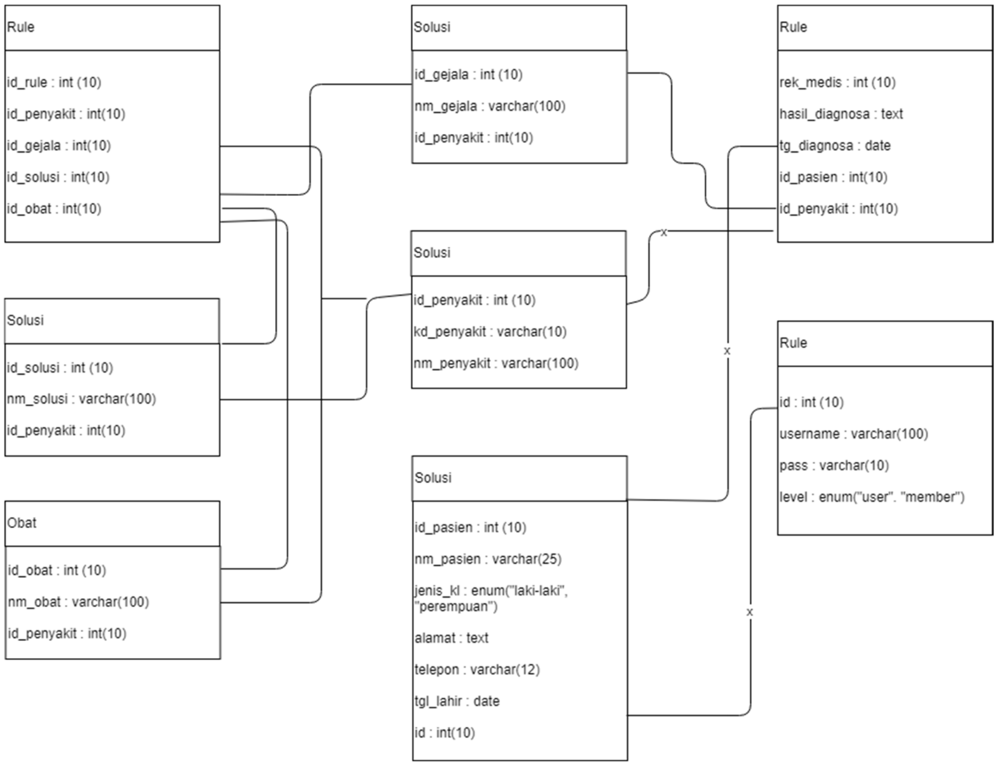


*Figure 3.6 MDR diagram*

## IV. IMPLEMENTATION SYSTEM

### 4.1 Interface Implementation

Interface implementation is a form or menu that exists in a system. The form or menu consists of:

a) Register Form
b) Login Form
c) Biodata Form
d) Consultation Form
e) Diagnostic Result Form
f) Medical Record Form

As for one of the menu views on the application:

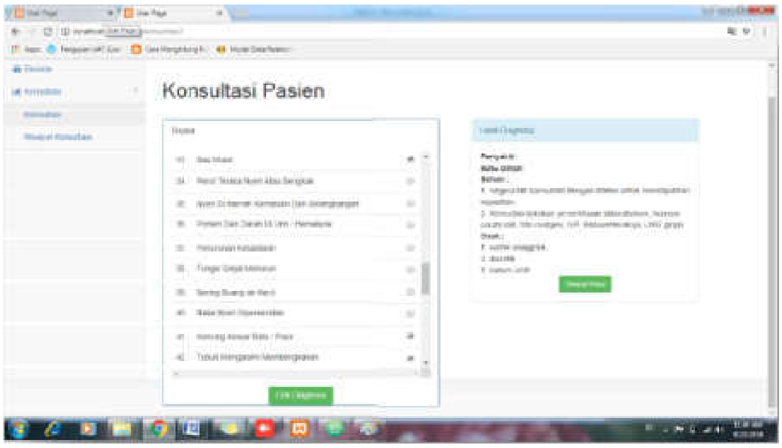


*Figure 4.1 Diagnostic Result Form*

## V. TESTING AND DISCUSSION OF RESULTS

### 5.1 Testing

Testing is the most important thing that aims to find errors or deficiencies in the software to be tested. Testing intends to find out the software that is made already meets the criteria in accordance with the design objectives of the software. This time system testing uses the Black Box method and uses the Functional Testing technique.

Testing the ease of use of this system is done to find out whether software or systems that have been made easy to use by users. This test uses a questionnaire to determine the response of respondents to the application being implemented. For 9 questions given to 20 respondents. Form results from system testing that has been carried out by 20 respondents.

| | |
|---|---|
| Yes | 2 |
| No | 1 |

*Table 5.1 weight value*

| Answer | Explanation |
|---|---|
| 0% - 50 % | No |
| 55% - 100 % | Yes |

*Table 5.2 percentage value*

From the data obtained above then processed by multiplying each answer point with a predetermined weight with a weighted value table. Then the Results of Calculation of respondents' answers as follows:

1. First Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 becomes 40/40 x 100 = 100% "Yes" category.
2. Second Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 so it's 40/40 x 100 = 100% "Yes" category.

3. Third Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 so it's 40/40 x 100 = 100% "Yes" category.
4. Fourth Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 becomes 40/40 x 100 = 100% "Yes" category.

5. Fifth Question
   From the table above it can be seen that of the 20 respondents, 18 respondents who answered Yes (2) = 2 x 18 = 36 while 2 respondents who answered No (1) = 1 x 2 = 2 Total Score = 36 + 2 = 38, then the settlement the end is 2 x 20 = 40, 1 x 20 = 20 so it's 38/40 x 100 = 95% "Yes" category.
6. Sixth Question
   From the table above it can be seen that from 20 respondents, 18 respondents answered Yes (2) = 2 x 0 = 0 while 20 respondents answered No (1) = 1 x 20 = 20 Total Score = 0 + 20 = 20, then the settlement the end is 2 x 20 = 40, 1 x 20 = 20 so it's 20/40 x 100 = 50% "No" category.
7. Seventh Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 becomes 40/40 x 100 = 100% "Yes" category.
8. Eighth Question
   From the table above it can be seen that the number of respondents 20 who answered Yes (2) = 2 x 20 = 40 while respondents who answered No (1) = 0 x 1 = 0 Total Score = 40 + 0 = 40, then the final settlement is 2 x 20 = 40, 1 x 20 = 20 becomes 40/40 x 100 = 100% "Yes" category.
9. Question Ninth
   From the table above it can be seen that of the 20 respondents, 18 respondents who answered Yes (2) = 2 x 18 = 36 while 2 respondents who answered No (1) = 1 x 2 = 2 Total Score = 36 + 2 = 38, then the settlement the end is 2 x 20 = 40, 1 x 20 = 20 so it's 38/40 x 100 = 95% "Yes" category.

Judging from the results of Functional Testing and Ease of Testing System, this program is appropriate to be used as a system for diagnosing kidney disease in humans using the backward chaining method.

## VI. CONCLUSION

From the results of the previous chapters' research on the diagnosis of kidney disease in humans, several conclusions can be drawn. Including the following:

1) From the tests carried out that the kidney disease diagnosis system can be accepted by the user / patient.
2) The existence of this system is expected to make it easier for ordinary people to diagnose kidney disease and its treatment.
3) Implementation in inference using the backward chaining method so that it can easily find out the symptoms experienced by the user / patient in the diagnosis of kidney disease.

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