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Expert System for Diagnosing Lipoma Disease in Hospital Patients Latersia Using the Certainty Factor (CF) Method

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Abstract

Lipoma disease is a disease characterized by a lump filled with a layer of fat that gradually accumulates under the skin, where this lump is between the skin and the muscle layer. This disease often appears on the neck, back, shoulders, arms, and thighs. In general, fat lumps or lipomas can be said to have slow growth between the skin and muscle layers. People tend to just let the lumps happen to them and think they are just normal lumps, without carrying out further examinations. The queue to see a doctor for further examination is also a factor. Therefore, it is necessary to make efforts so that the public can obtain information and be able to diagnose lipoma early without having to visit a doctor. From the description above, it is the basis for building a system that can provide information on lipoma disease and diagnose lipoma disease early. The system to be built can produce an early diagnosis analysis based on symptoms that are felt like a doctor, this system is commonly called an expert system, to support accuracy in building an expert system a method is needed in the analysis of its completion. One of the methods to be used is Certainty Factor (CF). The CF method is a clinical parameter value given by MYCIN to indicate the level of trust. The php programming language and MySQL database can build a system for diagnosing lipoma disease using the Certainty Factor method. type of lipoma Lipo Sarcoma 42.24%, Spindle cell lipoma, 56.59%, Myxoid liposarcoma 51.36%, Hibernoma 32%, Intramuscular hemangioma 51.48%, Chondroid lipoma 51.48%, Atypical lipoma 24%. From these results it can be said that the greatest confidence value is the type of Spindle cell lipoma disease with a confidence value of 56.59%.

Keywords: *Expert System, Lipoma, Certainty Factor Method, PHP, MySQL.*

1. Introduction

Lipoma is a disease characterized by a lump containing a layer of fat that gradually accumulates under the skin, where this lump is between the skin and the muscle layer. This disease often appears on the neck, back, shoulders, arms and thighs. In general, this fat lump or lipoma can be said to have slow growth between the skin and the muscle layer. If pressed gently with your finger, the lipoma will feel soft and easy to shake. The cause of lipomas is not yet known with certainty, however, there are suggestions that genetic factors play a role in the growth of lipomas. Several genetic conditions that can increase a person's risk of developing lipomas are Madelung disease, Cowden syndrome, familial multiple lipomatosis, adiposis dolorosa and Gardner syndrome (yankes.kemkes.go.id).

Lipoma is characterized by the appearance of lumps in several parts of the body. These lumps have characteristics such as, they feel soft when touched and shaken, they are colorless, do not cause pain, grow slowly, are benign and rarely develop into malignancies, are small in size 2-3 cm, but can enlarge up to 6-8 cm. However, there are still many people who do not fully understand the signs and symptoms of Lipoma disease. In addition, the information obtained by the public is also minimal regarding lipoma disease. People tend to just ignore the lumps that occur to them and assume they are just ordinary lumps, without carrying out further examination. Queuing to see a doctor to carry out further examinations is also a factor. For this reason, efforts need to be made so that the public can obtain information and be able to diagnose Lipoma early without having to go to a doctor.

From the description above, it is the basis for building a system that can provide information on lipoma disease and diagnose lipoma disease early. The system that will be built can produce early diagnostic analysis based on the symptoms felt like a doctor, this system is usually called an expert system. An expert system is In other words, an expert system is a computer system that is intended to imitate all aspects (emulates) the decision making ability of an expert. Expert systems make maximum use of special knowledge like an expert to solve problems [1]–[4] .

Supporting accuracy in building an expert system requires a method for analyzing the solution. One method that will be used is Certainty Factor (CF). CF is a clinical parameter value provided by MYCIN to indicate the level of confidence. CF shows a measure of certainty regarding a fact or rule. The Certainty factor method uses a value to assume the degree of confidence an expert has in data. Certainty Factor introduces the concept of belief and disbelief which is then formulated in a basic formulation.

The aim of this research is to build a system that can diagnose lipoma disease using the Certainty Factor method , to diagnose lipoma disease using the Certainty Factor method and to test and determine the Certainty Factor method in diagnosing lipoma disease. The benefit of this research is that it can make RSU easier. Latersia and the community, in providing information to patients and the public in diagnosing lipoma disease, can help patients in diagnosing lipoma disease early which can be accessed anywhere without having to go to the hospital or doctor and provide scientific insight into the use of the certainty factor method in diagnosing lipoma disease. , in creating an expert system that is easy to use, and easy to produce diagnoses like an expert.

2. Research Methods

2.1. Lipomas

Lipoma disease is a disease characterized by lumps containing layers of fat that gradually accumulate under the skin, where these lumps are located between the skin and the muscle layer [5]–[7] . This disease often appears on the neck, back, shoulders, arms and thighs. In general, this fat lump or lipoma can be said to have slow growth between the skin and the muscle layer. If pressed gently with your finger, the lipoma will feel soft and easy to shake (yankes.kemkes.go.id) .

The lumps that appear have the following characteristics:
1. Can grow larger, from the size of a marble to the size of a ping pong ball.
2. The growth of the lump is very slow.
3. It feels soft with a consistency like beef fat.
4. Easy to shake.
5. The lump can cause pain if it gets bigger and presses on the surrounding nerves.

2.2. Certainty Factor Method

Methods [3], [9], [10] is a clinical parameter value provided by MYCIN to indicate the level of trust. CF shows a measure of certainty regarding a fact or rule. The Certainty Factor method uses a value to assume the degree of confidence an expert has in data. Certainty Factor introduces the concept of belief and uncertainty which is then formulated in a basic formula.

There are several terms used in the CF method, namely:
1. EVIDENCE; Namely facts/symptoms that support a hypothesis, for example symptoms of disease.
2. HYPOTHESIS; Namely the results sought / results obtained from symptoms, for example disease
3. CF[H, E]; It is the Certainty Factor of hypothesis H which is influenced by symptom (evidence) E.
4. The CF value ranges from –1 to 1; The value –1 indicates absolute distrust while the value 1 indicates absolute trust.
5. MB; is a measure of increased belief , 0 <= MB <=1
6. MD; is a measure of increased disbelief , 0 <= MD <=1

Certainty Factor method has several possible combinations of two rules with different evidence but the same hypothesis. The formula for finding hypothetical Certainty Factor values originating from different evidence can be seen in equation (1).

$$CF(CF1,CF2) = CF1 + CF2\,(1-CF1) \quad (1)$$

where CF1 and CF2 have the same hypothesis:
CF1: Certainty Factor Evidence value 1 for the hypothesis
CF2: Certainty Factor Evidence 2 value for the hypothesis

The variable data will be P(H|E) which is used to find the value of trust and distrust. Application The identification process using the Certainty Factor method starts from looking for the confidence value (MB) and trust value (MD). The method used to find MB and MD values is net belief . Data on the probability of correctness of the hypothesis regarding the hypothesis obtained from experts has a value between 0 and 1 so that the net belief calculation formula can be seen in equations (2), (3) and formula (4) as follows.

$$MB(H,E) = \frac{\max[P(H,E),P90H]-P(H)}{\max[1,0]-P(H)} \quad (2)$$

$$MD(H,E) = \frac{\min[P(H,E),P90H]-P(H)}{\min[1,0]-P(H)} \quad (3)$$

$$CF(\text{Rule}) = MB(H,E) - MD(H,E) \quad (4)$$

Where:
CF (Rule) : certainty factor
MB (H,E) : measure of belief (measure of confidence) in hypothesis H, if given evidence E (between 0 and 1)
MD (H,E) : measure of disbelief (measure of disbelief) in hypothesis H, if given evidence E (between 0 and 1)
P(H) : probability of truth of hypothesis H
P (H|E) : the probability that H is true given the fact E

3. Material and Method

3.1. Research Methodology

In research to diagnose lipoma in patients at Latersia Binjai Hospital using the Certainty Factor method in the analysis and problem solving process, this method is expected to be able to provide accurate diagnostic results or almost resemble the results of an expert.

Based on the research to diagnose lipoma, it is explained that several stages that need to be carried out in the process of creating an expert system to diagnose lipoma in patients at Latersia Binjai Hospital using the Certainty Factor method are as follows.

1. Research Identification
   This stage is the initial stage, namely by determining the background of the problem, then identifying what problems are problems at the research site, then making problem boundaries, this is done to limit existing problems so that they do not spread and focus on the research being carried out and can help the writer. at the next stage.
2. Formulate Problems and Goals
   The author will formulate the problem, what will be the problem so this research needs to be carried out and made to determine objectives that are in accordance with the background and problems that have been formulated so that it produces benefits for those who use it.
3. Data collection
   Data collection related to this research was collected in 3 ways, namely direct observation of doctors regarding lipoma disease, literature study, namely studying manual and reference data related to the main problem and the system to be created as well as interview techniques conducted with experts. or a doctor to obtain information about the symptoms, disease and severity of symptoms consistent with lipoma disease.
4. Making Expert Systems
   At this stage, a system design is carried out for the problem being researched, this can be in the form of designing the workflow of the system and also designing the design of the interface of the system that will be created, namely an expert system for diagnosing lipoma in patients at Latersia Binjai Hospital. This system was built on a web basis using the PHP programming language and MySQL database.
5. Testing and Analysis of System Results
   Testing and analyzing previously tested methods, namely manual calculations using the system design that has been created and coding. Testing is carried out on systems that are built as expected and can find errors in the system and make improvements.
6. Conclusion
   In the final stage, a conclusion will be obtained which is a statement containing the results of this research.

3.2. Application of The Method

In creating an expert system, of course data is needed which will later be used as research supporting data. The supporting data for this research will later be used as data analysis using the Certainty Factor method . This research data was obtained from the research site and based on information from experts or doctors regarding lipoma disease. The supporting data for this research is as in table 1. following:

Table 1: Types of Lipoma Disease

No.	Disease Code	Types of Lipoma Disease
1.	P01	Lipo sarcoma
2.	P02	Spindle cell lipoma
3.	P03	Myxoid liposarcoma
4.	P04	Hibernoma
5.	P05	Intramuscular hemangioma
6.	P06	Chondroid lipoma
7.	P07	Atypical lipoma

The following is data on the symptoms of Lipoma disease obtained based on the doctor's statement:

Table 2: Symptoms of Lipoma Disease

No	Code	Symptom Name
1	G01	The lump slowly enlarges
2	G02	Feels pain
3	G03	There is a lump in the stomach
4	G04	The stomach is enlarged and feels full
5	G05	Stomach feels painful
6	G06	Constipation
7	G07	Bleeding during defecation
8	G08	Hard to breath
9	G09	There is a lump on the back of the neck/shoulder/back.
10	G10	Lumps filled with fat with elongated cells.
11	G11	A small lump appears
12	G12	The lump is denser
13	G13	Lumps filled with fat
14	G14	Large lump
15	G15	Benign
16	G16	Fast growing
17	G17	Experiencing local pressure effects
18	G18	lumps filled with brown fat
19	G19	There is a lump on the thigh
20	G20	Experiencing swelling on the surface area of the scalp
21	G21	The lump slowly enlarges
22	G22	The location in the abdominal muscles is more common.
23	G23	Experiencing thicker lumps than others

From the symptom data above, you can see the symptoms of lipoma based on the type of disease as in table 3 below . :

Table 3: Symptom Data Based on Disease

Code	Symptom Name	P01	P02	P03	P04	P05	P06	P07
G01	The lump slowly enlarges	v				v	v	
G02	Feels pain	v		v		v	v	v
G03	There is a lump in the stomach	v						
G04	The stomach is enlarged and feels full	v						
G05	Stomach feels painful	v						
G06	Constipation	v		v	v	v		v
G07	Bleeding during defecation	v						
G08	Hard to breath	v						
G09	There is a lump on the back of the neck/shoulder/back.		v					
G10	Lumps filled with fat with elongated cells.		v			v		
G11	A small lump appears		v		v			
G12	The lump is denser		v					
G13	Lumps filled with fat		v		v		v	v
G14	Large lump			v				
G15	Benign			v	v		v	
G16	Fast growing			v				
G17	Experiencing local pressure effects				v			
G18	lumps filled with brown fat						v	
G19	There is a lump on the thigh				v			
G20	Experiencing swelling on the surface area of the scalp					v		
G21	The lump slowly enlarges		v			v	v	
G22	The location in the abdominal muscles is more common.			v				v
G23	Experiencing thicker lumps than others			v		v		v

Next, determine the expert CF weight value for the symptoms of lipoma disease. This weight is obtained from expert information, the expert CF weights can be seen as in table 4 below:

Table 4: Expert CF Weight Values

No.	Level of confidence	Value Weight
1	Very confident	1
2	Certain	0.8
3	Sure enough	0.6
4	A little sure	0.4
5	Don't know	0.2
6	There isn't any	0

Next is the CF user MD weight data (Measure Disbelief) as in the table below:

Table 5: User Certainty Factor

No.	Level of confidence	Value Weight
1	Very confident	1
2	Certain	0.8
3	Sure enough	0.6
4	A little sure	0.4
5	Don't know	0.2
6	There isn't any	0

The method used in this research is the Certainty Factor method. The steps for this method are as follows:

1. Calculate the CF value with the following formula:
   CF expert * CF user
2. Combine CF 1.1 with CF 1.2 with the following formula:
   CF combine (CF1,CF2) = CF[h1,e1] + CF[h1,e2] *(1-CF[h1,e2]) = CF old
   Then combine CF old and CF[h1,e3]
3. Confidence percentage = CF combine * 100%

Case example: A patient has symptoms of lipoma with the following symptoms:

Table 6: Symptoms of Expert and User Answers

No	Code	Symptom	User Answers	Expert Answers
1	G01	The lump slowly enlarges	A little sure	Sure enough
2	G02	Feels pain	Sure enough	A little sure
3	G11	A small lump appears	Certain	A little sure
4	G12	The lump is denser	A little sure	Sure enough
5	G14	Large lump	Sure enough	Sure enough

6	G21	The lump slowly enlarges	A little sure	A little sure

From the symptoms of lipoma above, a calculation or analysis process was carried out using the Certainty Factor method to diagnose lipoma in patients at Latersia Binjai Hospital.

Calculate the Certainty Factor value for the type of Lipo Sarcoma disease by multiplying the expert's CF by the user's CF as shown in table 7. following:

Table 7: Calculating Symptoms of Lipo Sarcoma Disease Types

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
CF[H $_{1,}$ E $_{1}$]	0.6	0.4	0.24
CF[H $_{1,}$ E $_{2}$]	0.4	0.6	0.24

From the table above, the next step is to combine the Certainty Factor values :

CF $_{combine}$ CF[H $_{1}$,E] $_{1,3}$ = CF[H $_{1,}$ E $_{1}$] + CF[H $_{1,}$ E $_{2}$] * (1 - CF[H $_{1,}$ E $_{1}$])
= 0.24 + 0.24 * (1 – 0.24)
= 0.4224 $_{old1}$

The CF value results from the calculation above are:

CF $_{combine}$ CF[H $_{1}$,E] $_{old1}$ = CF[H $_{,}$ E] $_{old1}$ + CF[H $_{1,}$ E $_{21}$] * (1 - CF[H $_{,}$ E $_{1}$])
= 0.24 + 0.24 * (1 – 0.24)
= 0.4224 $_{old1}$
= 0.4224*100 = 42.24 %

Next, calculate the symptom value for Spindle Cell Lipoma (P02) with the following calculations:

Table 8: Counting Symptoms of Spindle Cell Lipoma Disease

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
CF[H $_{2,}$ E $_{11}$]	0.4	0.8	0.32
CF[H $_{2,}$ E $_{12}$]	0.6	0.4	0.24
CF[H $_{2,}$ E $_{21}$]	0.4	0.4	0.16

From the table above, the next step is to combine the Certainty Factor values :

CF $_{combine}$ CF[H $_{2}$,E] $_{old1}$ = CF[H $_{,}$ E $_{11}$] + CF[H $_{2,}$ E $_{12}$] * (1 - CF[H $_{,}$ E $_{11}$])
= 0.32+ 0.24 * (1 – 0.32)
= 0.4832 $_{old1}$

CF $_{combine}$ CF[H $_{2}$,E] $_{old2}$ = CF[H $_{,}$ E $_{old1}$] + CF[H $_{2,}$ E $_{21}$] * (1 - CF[H $_{,}$ E $_{old1}$])
= 0.32+ 0.16 * (1 – 0.32)
= 0.5659 $_{old2}$

The CF value results from the calculation above are:

CF $_{combine}$ CF[H $_{2}$,E] $_{old2}$ = CF[H $_{,}$ E $_{old1}$] + CF[H $_{2,}$ E $_{21}$] * (1 - CF[H $_{,}$ E $_{old1}$])
= 0.32+ 0.16 * (1 – 0.32)
= 0.5659 $_{old2}$
= 0.5659* 100 = 56.59 %

Next, calculate the symptom value for Myxoid Liposarcoma (P03) with the following calculations:

Table 9: Counting Symptoms of Myxoid Liposarcoma

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
CF[H $_{3,}$ E $_{2}$]	0.4	0.6	0.24
CF[H $_{3,}$ E $_{14}$]	0.6	0.6	0.36

From the table above, the next step is to combine the Certainty Factor values :

CF $_{combine}$ CF[H $_{3}$,E] $_{old1}$ = CF[H $_{3,}$ E $_{2}$] + CF[H $_{3,}$ E $_{14}$] * (1 - CF[H $_{3,}$ E $_{2}$] $_{old1}$)
= 0.24+ 0.36 * (1 – 0.24)
= 0.5136 $_{old1}$

The CF value results from the calculation above are:

CF $_{combine}$ CF[H $_{3}$,E] $_{old1}$ = CF[H $_{3,}$ E $_{2}$] + CF[H $_{3,}$ E $_{14}$] * (1 - CF[H $_{3,}$ E $_{2}$] $_{old1}$)
= 0.24+ 0.36 * (1 – 0.24)
= 0.5136 $_{old1}$
= 0.5136*100 = 51.36 %

Next, calculate the value of the symptoms of Hibernoma (P04) with the following calculations:

Table 10: Calculating Symptoms of Hibernoma

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
CF[H $_{4,}$ E $_{11}$]	0.6	0.8	0.48

From the table above, the next step is to combine the Certainty Factor values :

$CF_{combine}\,CF[H_4,E]_{old1} = CF[H_{4,}E_{11}] + CF[H_{4,}E] * (1 - CF[H_{4,}E_{11}]_{old1})$

$= 0.48 + 0 * (1 - 0.48)$

$= 0.48_{old1}$

The CF value results from the calculation above are:

$CF_{combine}\,CF[H_4,E]_{old1} = CF[H_{4,}E_{11}] + CF[H_{4,}E] * (1 - CF[H_{4,}E_{11}]_{old1})$

$= 0.48 + 0 * (1 - 0.48)$

$= 0.48_{old1}$

$= 0.48 * 100 = 48\ \%$

Next, calculate the symptom value of Intramuscular Hemangioma (P05) with the following calculations:

Table 11: Calculating Symptoms of Intramuscular Hemangioma

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
$CF[H_{5,}E_1]$	0.6	0.4	0.24
$CF[H_{5,}E_2]$	0.6	0.6	0.36
$CF[H_{5,}E_{21}]$	0.4	0.4	0.16

From the table above, the next step is to combine the Certainty Factor values :

$CF_{combine}\,CF[H_5,E]_{old1} = CF[H_{5,}E_1] + CF[H_{5,}E_2] * (1 - CF[H_{5,}E_1]_{old1})$

$= 0{,}24 + 0{,}36 * (1 - 0{,}24)$

$= 0{,}5136_{old1}$

$CF_{combine}\,CF[H_5,E]_{old2} = CF[H_{5,}E_{old1}] + CF[H_{5,}E_{21}] * (1 - CF[H_{5,}E_{2old1\}}])$

$= 0.5136 + 0.16 * (1 - 0.5136)$

$= 0.5914_{old2}$

The CF value results from the calculation above are:

$CF_{combine}\,CF[H_5,E]_{old2} = CF[H_{5,}E_{old1}] + CF[H_{5,}E_{21}] * (1 - CF[H_{5,}E_{2old1\}}])$

$= 0.5136 + 0.16 * (1 - 0.5136)$

$= 0.5914_{old2}$

$= 0.5914 * 100 = 59.14\ \%$

Next, calculate the symptom value for Chondroid Lipoma (P06) with the following calculations:

Table 12: Calculating Symptoms of Chondroid Lipoma

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
$CF[H_{56,}E_1]$	0.6	0.4	0.24
$CF[H_{6,}E_2]$	0.6	0.6	0.36
$CF[H_{6,}E_{21}]$	0.4	0.4	0.16

From the table above, the next step is to combine the Certainty Factor values :

$CF_{combine}\,CF[H_6,E]_{old1} = CF[H_{6,}E_1] + CF[H_{6,}E_2] * (1 - CF[H_{6,}E_1]_{old1})$

$= 0{,}24 + 0{,}36 * (1 - 0{,}24)$

$= 0{,}5136_{old1}$

$CF_{combine}\,CF[H_6,E]_{old2} = CF[H_{6,}E_{old1}] + CF[H_{6,}E_{21}] * (1 - CF[H_{6,}E_{2old1\}}])$

$= 0.5136 + 0.16 * (1 - 0.5136)$

$= 0.5914_{old2}$

The CF value results from the calculation above are:

$CF_{combine}\,CF[H_6,E]_{old2} = CF[H_{6,}E_{old1}] + CF[H_{6,}E_{21}] * (1 - CF[H_{6,}E_{2old1\}}])$

$= 0.5136 + 0.16 * (1 - 0.5136)$

$= 0.5914_{old2}$

$= 0.5914 * 100 = 59.14\ \%$

Next, calculate the symptom value for Atypical Lipoma (P07) with the following calculations:

Table 13: Counting Symptoms of Atypical Lipoma

Disease | Symptom	Expert CF	CF user	Results (Expert CF * User CF)
$CF[H_{6,}E_2]$	0.4	0.6	0.24

From the table above, the next step is to combine the Certainty Factor values:

$CF_{combine}\,CF[H_7,E]_{old1} = CF[H_{7,}E_2] + CF[H_{7,}E] * (1 - CF[H_{7,}E_2]_{old1})$

$= 0.24 + 0 * (1 - 0.24)$

$= 0.24_{old1}$

The CF value results from the calculation above are:

$CF_{combine}\,CF[H_{7},E]_{old1} = CF[H_{7},E_{2}] + CF[H_{7},E] * (1 - CF[H_{7},E_{2}]_{old1})$

$= 0.24 + 0 * (1 - 0.24)$

$= 0.24_{old1}$

$= 0.24 * 100 = 24\ \%$

Based on the results of the CF calculation above, the results obtained are as in table 14. below:

Table 14: CF Calculation Results Against Lipoma Disease

No.	Disease Code	The type of disease	Confidence Percentage
1.	P01	Lipo Sarcoma	42.24%
2.	P02	Spindle cell lipoma	56.59%
3.	P03	Myxoid liposarcoma	59.04%
4.	P04	Hibernoma	48%
5.	P05	Intramuscular hemangioma	59.14%
6.	P06	Chondroid lipoma	59.14%
7.	P07	Atypical lipoma	24%

From the table above, it is known that the patient had lipoma with a type of disease, namely intramuscular hemangioma and Chondroid lipoma with a confidence value of 59.14% .

4. Result

System interface to make it easier for users to use the lipoma diagnosis expert system. Interface built to diagnose lipoma disease has several menus that will be used to diagnose lipoma disease. This interface is used by the admin who has full access to process the expert system for diagnosing lipoma disease while the user can only see the results of the history that has been carried out by the admin or expert . The interface that has been built for the lipoma diagnosis expert system is as follows.

1. Main page

The main page is the initial page that will appear the first time this system is called or opened. This page will display the home menu , login . This page is the main page to be able to access all menus. The appearance of this menu is as in the image below:

Figure 1: Main page

2. Login Page

From the main page above, to be able to access all menus in the system or to be able to use the system, the user or admin must log in first. The login page display can be seen as in the image below:

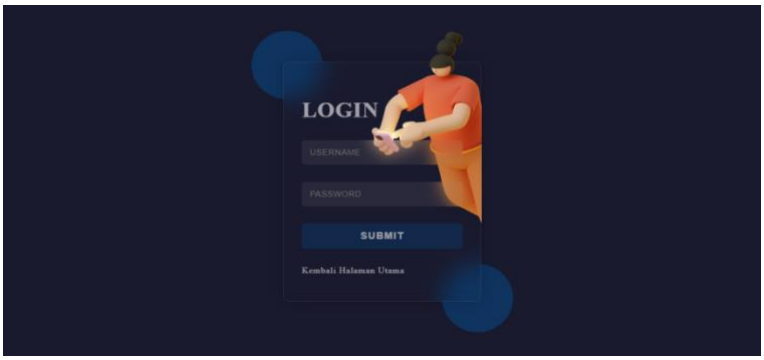

Figure 2: Login Page

3. Patient Consultation History Page

This page was created to display data on the consultation history of patients who have consulted with experts . The display of the patient consultation history page can be seen as in the image below:

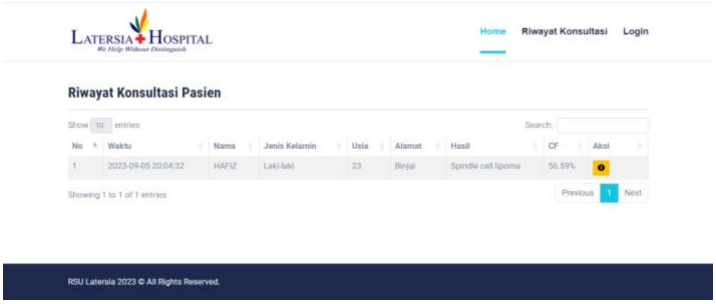

Figure 3: Patient Consultation History Page

4. Admin Main Page

The main admin page is a page that displays all the menus in the system. In this menu the admin can manage admin data, symptom data, disease data, rules or knowledge base, history and admin data. The appearance of the main admin page can be seen as in the image below:

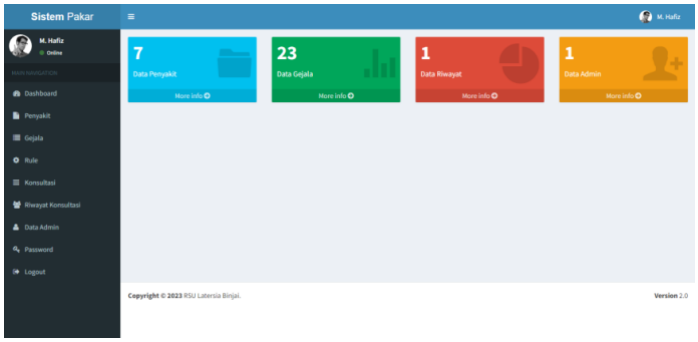

Figure 4: Admin Main Page

5. Disease Page

The disease page is used by the admin to input, change and delete lipoma disease data. The display of the disease page can be seen as in the image below:

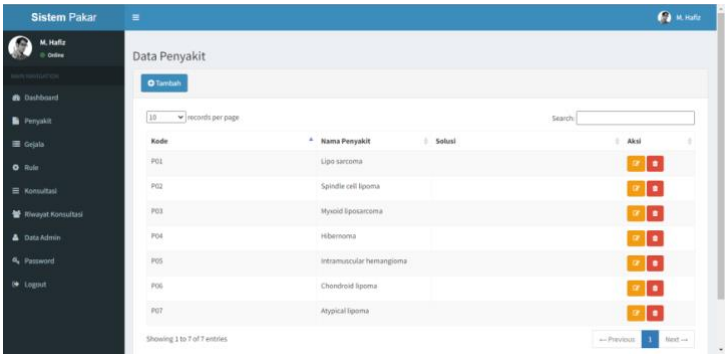

Figure 5: Disease Page

6. Symptoms Page

The symptoms page is used by the admin to input, change and delete lipoma symptom data. The display of the disease page can be seen as in the image below.

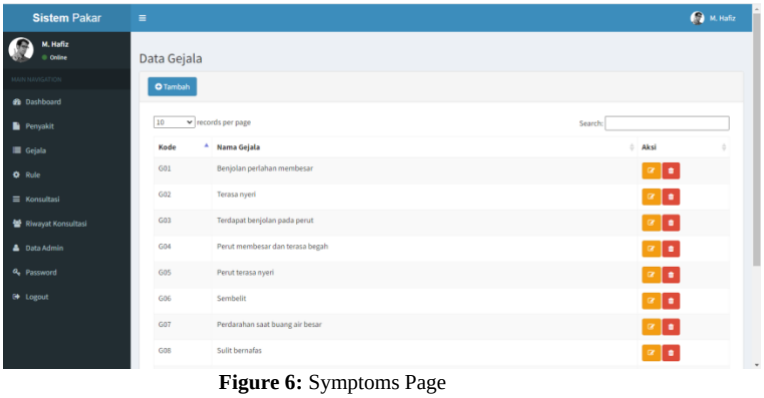

Figure 6: Symptoms Page

7. Rules Page

Rules page is used by the admin to input, change and delete rule data or expert knowledge base provided by experts based on lipoma symptom and disease data. The appearance of the rules page can be seen as in the image below:

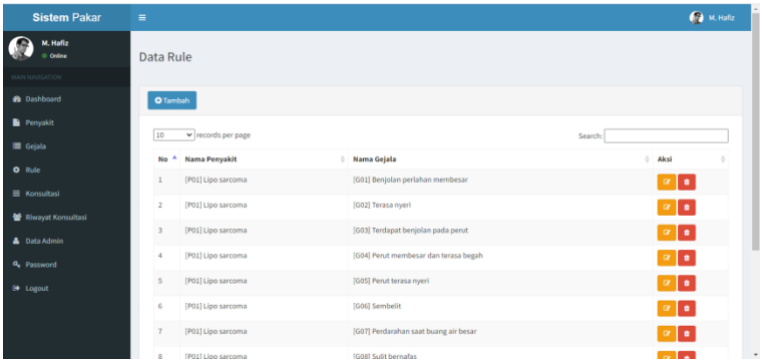

Figure 7: Rules Page

8. Consultation Page

The consultation page is used by the admin to consult on lipoma disease. Where the admin inputs the symptoms felt by the patient and inputs the expert trust value, then click consultation results in a diagnosis of lipoma can be known. The appearance of the consultation page can be seen as in the image below:

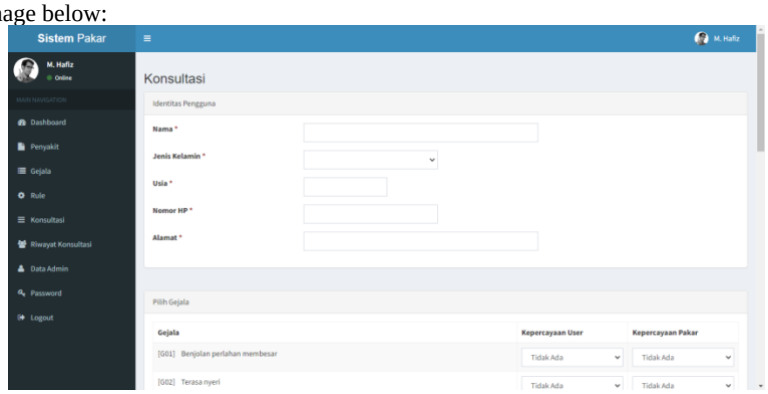

Figure 8: Consultation Page

9. Consultation History Page

The consultation history page contains data on users who have consulted on the system. This consultation history will display in detail the symptoms and diseases that have been diagnosed by the system and can be reprinted if the user or admin needs this data. The appearance of this history page can be seen as in the image below:

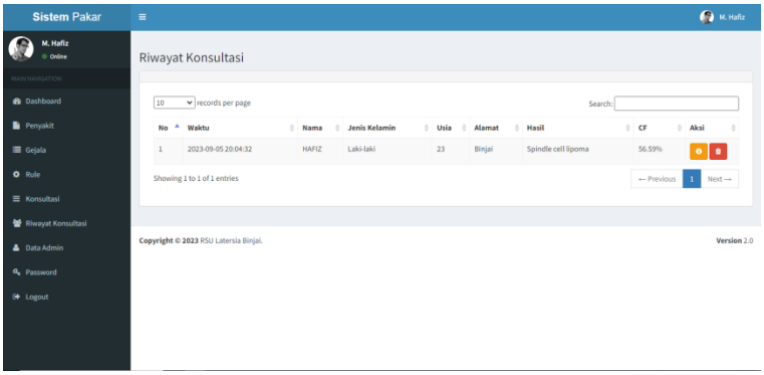

Figure 9: Consultation History Page

10. Admin Data Page

The admin data page is used by admins to add, change and delete admin data. The appearance of the admin data page can be seen as in the image below:

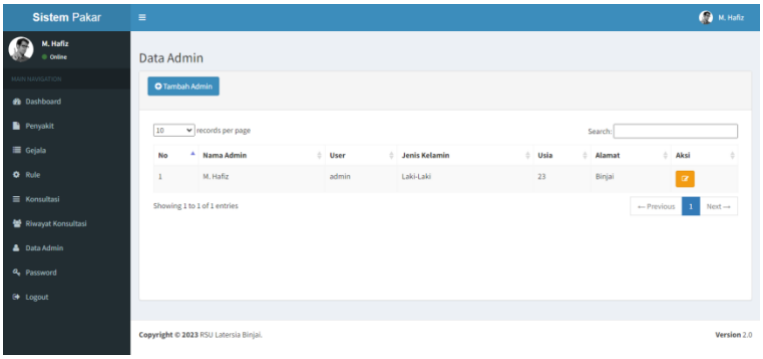

Figure 10: Admin Data Page

11. Password Page

Password page is used to change passwords for both admin and user . The appearance of this menu is as follows:

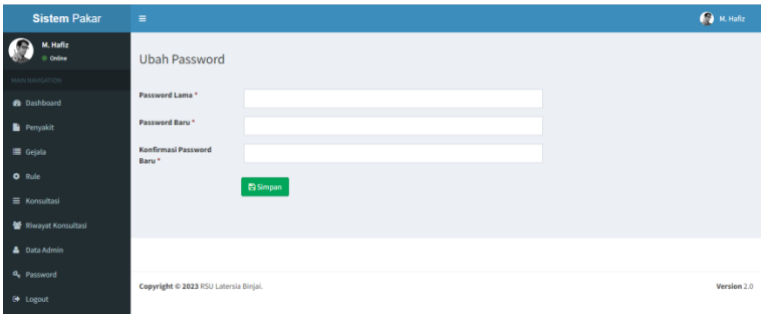

Figure 11: Password Page

5. Conclusion

From the results of the research carried out, it greatly increases knowledge and insight, by collecting data related to lipoma disease, it can be concluded that the PHP programming language and MySQL *database* can build a system for diagnosing lipoma disorders using the *Certainty Factor method* , based on Lipoma symptom data using the *Certainty Factor method* , this method can diagnose the type of lipoma disease and from the trust weight values of both users and experts, the results obtained are *Lipo Sarcoma* , 42.24%, *Spindle cell lipoma* , 56.59%, *Myxoid. liposarcoma* 51.36%, Hibernoma 32%, *Intramuscular hemangioma* 51.48%, *Chondroid lipoma* 51.48%, *Atypical lipoma* 24% . From these results it can be said that the greatest confidence value is the type of *Spindle cell lipoma disease* with a confidence value of 56.59%.

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