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An Expert System for Hib Problems

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***Abstract*— *In this paper We're going to talk about science and symptoms for the clinical diagnosis of osteoarthritis of the hip enroll. In our Paper the diagnosis of osteoarthritis based the Expert system based on radiographic appearance of the joint space according to the criteria of Calgon and Lauren's rather than clinical features. However, it shows that radiographic imaging and the amount of pain and limitation of patient experiences does not have as strong of a correlation, as once believed more, so central sensitization and psychosocial factors might play an important role in explaining which patients with radiographic osteoarthritis experience pain and which don't the clinical classification criteria. The moderate clinical value the clinical classification criteria contained the presence of hip pain plus the following items one hip internal rotation range of motion.*

Keywords— Artificial Intelligence; Expert Systems; Hib problems

I. INTRODUCTION

Causes of hip pain what are the common causes of hip pain. Pain can arise from the structures that are within the hip joint or from the structures surrounding the hip joint. The most important thing is to ask the patient to locate the site of the pain. Asking the patient to point at the sight of the pain. When the patient states that their hip heads it doesn't mean the pain is coming from the hip joint itself so ask the patient to point at the sight of the pain. The pain can arise from structures that are within the hip joint or from structures surrounding the hip. The hip joint on the bony model the hip joint is a weight bearing joint the joint consists of two main parts the femoral head which is the ball and the socket the socket is called the astableum. So the hip pain can be anterior hip pain deep groin pain. The pain can be lateral head pain. The pain can be posterior hip pain or far posterior hip pain coming from the circular iliac joint and the lower spine anterior hip pain usually deep in the groin. It can result from arthritis of the hip. The treatment is usually conservative treatment with physiotherapy anti-inflammatory medication possible injections and surgery is done in late cases usually by total hip replacement anterior hip pain labral tear it is usually diagnosed by a clinical exam with a provocative test of flexion abduction and internal rotation and the diagnosis is confirmed by an mri arthrogram. The treatment can be conservative done by therapy by anti-inflammatory medications or by injections. Surgical treatment provides good result usually done by arthroscopic debridement or repair of the tear. Another reason for the anterior hip pain is stress fracture which is usually diagnosed by an MRI the x-ray may be normal. Early diagnosis is important before the fracture displaces and gives a bad result. The treatment is usually surgery by fixation of the fracture. Fixation of the fracture is usually performed utilizing screws. Femoral head replacement is done in rare late cases another entity that causes anterior hip pain is a vascular necrosis of the femoral head. The normal blood supply of the femoral head is very tenuous very precious a vascular necrosis means death of a segment of the bone when the blood supply of the femoral head is interrupted a segment of the bone dies and becomes necrotic and the femoral head will collapse the diagnosis is usually done by an MRI and the treatment in early stages of vascular necrosis without collapse of the femoral head you will do decompression by drilling of this segment in the thermal head to bring a new blood supply to the area. Vascularized fibular graft may be used also in severe cases with collapse of the femoral head usually diagnosed by an x-ray. The treatment is usually a total hip replacement. Lateral hip pain is usually due to inflamed bursa the treatment is usually conservative with physiotherapy anti-inflammatory medications and injections. Surgical treatment by excision of the bursa is rarely done. In case of chronic resilient trochanteric breastitis try to get an MRI to exclude a tear of the abductor muscles of the hip. The gluteus medius and gluteus minimus muscle tear. Posterior hip pain is usually due to peripheral syndrome the sciatic nerve can be irritated from the piriformis syndrome treatment is usually physiotherapy stretching anti-inflammatory medications and injections, surgical treatment is usually rare it is the last resort and it includes release of the performance tendon and exploration of the sciatic nerve and it is done in cases that failed to improve with conservative treatment. Far posterior pain may come from the sacroiliac joint or from the lower spine conditions. The SI joint problems is a challenging diagnostic and treatment entity. There's a lot of clinical examinations that can be used to diagnose the side joint such as the faber test and others. However injection of the SI joint is probably the method to diagnose pain originating from the side joint. If there is improvement of the condition of the patient after injection of the sacroiliac joint then we will probably consider that the problem is in the inside joint. The side joint problems are usually underestimated and are unappreciated lower spine conditions can cause referred pain to the buttock and hip area

in fact symptoms of hep and lower spine conditions can overlap or both of them can coexist in the same patient and you have to separate pain from the hep from pain that comes from the spine.

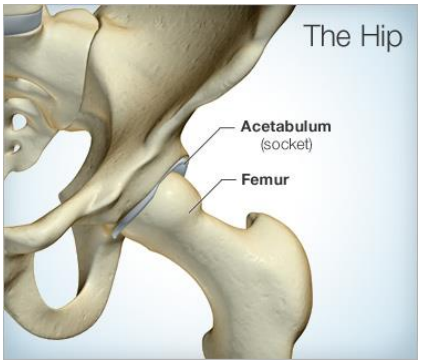


Fig. 1 Hib joint

II. EXPERT SYSTEM LANGUAGE

Expert system is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge represented mainly as if-then rules the typical expert system consists of

1. Interface is the system that allows a non-expert user to query or question the expert system and to receive advice the user interface is designed to be a simple to use as possible on the other hand the inference engine may also include abilities for explanation so that it can explain to a user the chain of reasoning used to arrive at a particular conclusion by tracing back over the firing of rules that resulted.

2. Knowledge base: knowledge base, which is a collection of facts created from information provided by human experts. It is a database designed in a way to allow the storage and retrieval requirements of the expert systems next rules base. It is a set of rules for making deductions from the data this is made up of a series of inference rules represented mainly as if-then rules this inference rules which closely follow human reasoning are used by the inference engine to draw conclusions.

3. An inference engine which acts like the search engine that applies inference rules in examining the knowledge base for information that meshes the users query it attends to drive answers from the knowledgebase using a form of reasoning.

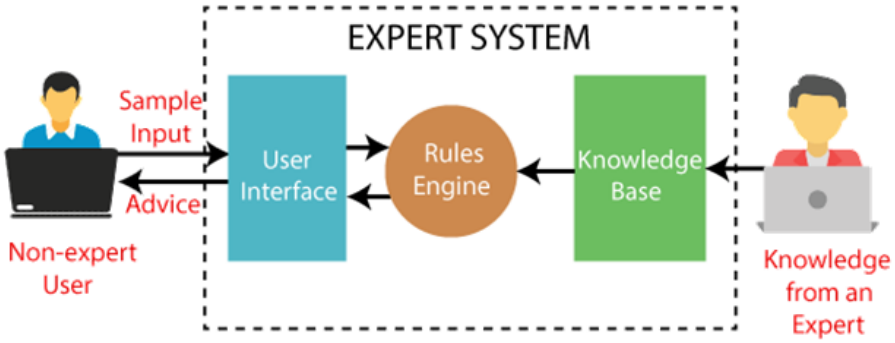


Fig. 2: Components of an expert system

The propped Expert System for Hib problems diagnosis was designed and implemented in Simpler Level 5 Object (SL5 Object) implemented in Delphi Embarcadero RAD Studio XE6 for efficiency and portability, developed by Prof. Dr. Samy S. Abu Naser.

III. MATERIALS AND METHODS

The proposed expert system will ask the user to answer the questions about the symptoms of the patient and end up with the diagnosis; accordingly, the expert system shows the user some information about the disease and some recommendation telling the Patient how to deal with the Hib. Figure 3 shows the decision tree of the expert system for diagnosing the Hib problems.

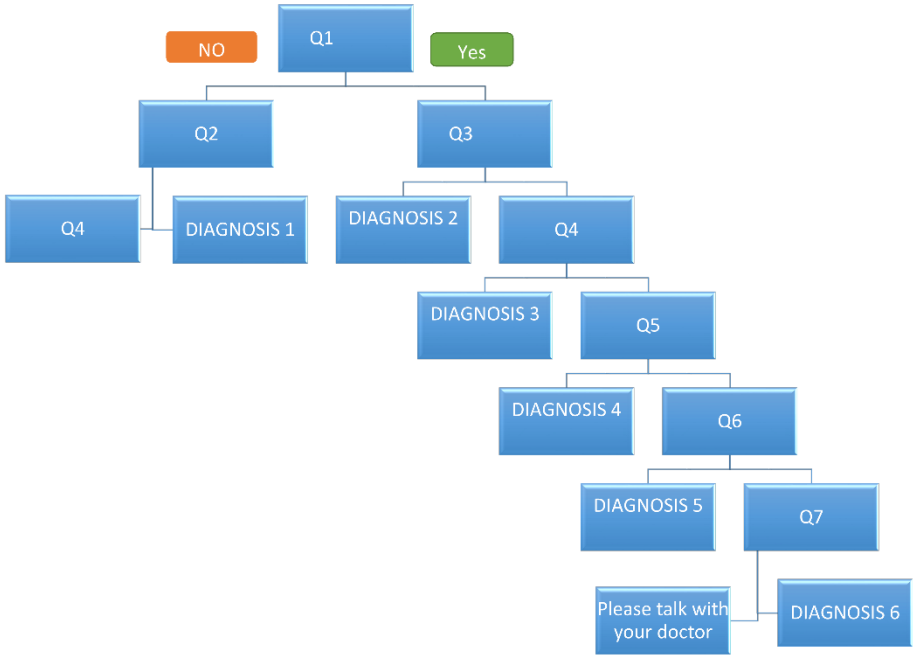


Fig. 3: Decision tree of the expert system.

Q1 Did you fall or suddenly feel your hip give way?
Q2 Do the toes on your leg on the side of your injured hip seem to turn out, and does it hurt to straighten, lift, or stand on your leg?
Q3 Do you have stiffness, swelling, redness, or pain in any other joints?
Q4 Have you felt a "click" in your hip or occasional pain with activity?
Q5 Do you have pain in the back of your hip that starts in your lower back and travels into your buttocks or into your leg?
Q6 Is the person a child with pain in the knees, hips, or groin?
Q7 Do you have pain in your hip that is also on the outside (lateral) part of your knee?

DIAGNOSIS1: Your pain and deformity may be from a HIP FRACTURE.
SELF CARE1: URGENT- Go to the closest emergency room or call an ambulance."

DIAGNOSIS2: Your hip pain may be from ARTHRITIS.
SELF CARE2: Try an anti-inflammatory medicine. If you don't feel better, see your doctor."

DIAGNOSIS3: You may have a CONGENITAL HIP PROBLEM, a deformity of the hip joint that began before birth. You may also have TROCHANTERIC BURSITIS, an inflammation of the outside (lateral) part of your hip.
SELF CARE3: See your doctor.

DIAGNOSIS4:Your symptoms may be from SCIATICA, a pinched nerve. If the pain shoots down your leg near your knee or to your foot, this could also be from a RUPTURED or HERNIATED DISC in your low back.
SELF CARE4: Heat, anti-inflammatory medicine, and rest may help. See your doctor if the pain continues or if it travels down your leg. Contact your doctor immediately if you develop difficulty controlling urination or bowel movements, have fever, have a history of cancer, or experience unintentional weight loss."

DIAGNOSIS5: This could be related to a number of disorders, including a SLIPPED CAPITAL FEMORAL EPIPHYSIS (often associated with teenagers who are overweight or obese).

SELF CARE5: See your doctor."

DIAGNOSIS6: You may have ILIOTIBIAL BAND SYNDROME. This is more common in runners and cyclists (straight-ahead activities).
SELF CARE6: Stretching and applying ice can help. See your doctor if the pain and discomfort worsens or does not improve with rest.

IV. BACKGROUND

Most of the time there is a very simple explanation for hip pain, for example if you've overdone it while exercising. In this case your pain is usually caused by strained or inflamed soft tissues, such as tendons, and it often clears up within a few days. Long-term hip pain can be caused by specific conditions.

If you have a problem with your hip joint you may feel pain in the groin, down the front of the leg and in the knee. Sometimes knee pain is the only sign of a hip problem – this is called referred pain or radiated pain and is fairly common. You may feel pain on the outside of your hip or in your buttock – though this can also be caused by problems with your lower back.

Hip fracture:

A hip fracture is a break that occurs in the upper part of the bone. Symptoms may include pain around the hip, particularly with movement, and shortening of the leg. Normally the person cann't walk. That most often occur because of falling but the risky issue is that osteoporosis, taking many medications, alcohol use, and metastatic cancer. Diagnosis is generally by X-rays. Magnetic resonance imaging, a CT scan, or a bone scan may occasionally be required to make the diagnosis.

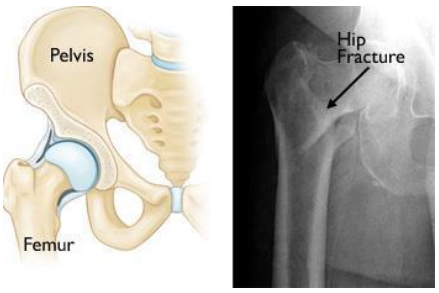


Fig. 4: Hip fracture

Arthritis

Arthritis is one of the most common causes of pain in the hip. Arthritis is a progressive disorder, which means that it typically starts gradually and gets worse with time. The term arthritis literally means "inflammation of the joint.". The joints that become affected, how badly, and at what age vary from person to person, depending upon other factors specific to everyone, such as: anatomic structure of the hip (the natural strength and/or angles of a person's bones), weight or activity level.

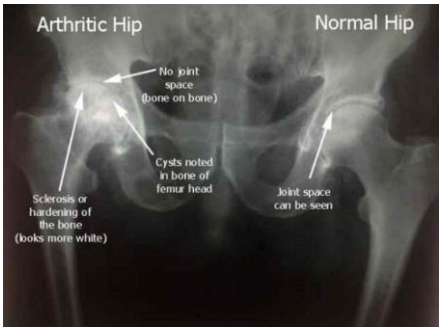


Fig. 5: Arthritis

Congenital hip:

The hip is a ball-and-socket joint. Normally, the ball at the top of the thigh bone fits into the hip socket. Hip dysplasia occurs when the hip joint has not developed properly and the socket (acetabulum) is too shallow. This allows the ball (femoral head) to slip partially or completely out of the joint. Hip dysplasia ranges from a mild abnormality to a complete dislocation of the hip. Hip dysplasia can affect anyone at any age. Although it is believed to develop around birth, a child with mild dysplasia may not have symptoms for years, or even decades.

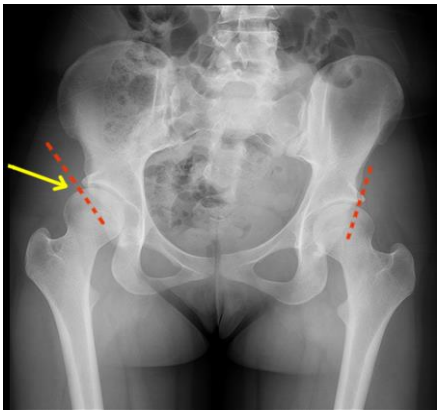


Fig. 6: Congenital hip

Sciatica:

Sciatica is a term used to describe symptoms like pain weakness numbness burning or tingling in the legsciatica can be caused by a lumbar herniated disc degenerative disc disease. Lumbar stenosis or spondylolisthesis as a disc degenerates and breaks down the inner core can leak out through the outer portion of the disc this condition is known as disc herniation which puts direct pressure on the nerve and consequence of aging or trauma the intervertebral discs can be damaged or degenerated loss of disc height can cause bulging of the disc putting pressure on the nerves exiting the spine disc degeneration and facet joints. Overloading can cause their arthritic overgrowth this resultant loss of space and the foramen can cause squeezing or inching of the nerves roots as they exit. The spine this condition is called lateral stenosis spondylolisthesis is a common lumbar spine problem when the disc is unstable and allows the upper vertebral body to slide forward.

Fig. 7: Sciatica

Slipped capital femoral epiphysis:

The femur is the long bone of the thigh. The end of the femur that connects with the hip consists of a "ball" (called the femoral head). The ball fits inside of a "cup" that is made up of the pelvic bones and is known as the acetabulum. During growth, the end of the head is known as the epiphysis and is connected to the rest of the femur by the growth plate.

Fig. 8: Slipped capital femoral epiphysis

Iliotibial band syndrome is an overuse injury of the connective issues that are located on the outer thigh and knee. The iliotibial band runs along the lateral or outside aspect of the thigh, from the pelvis to the tibia, crossing both the hip and knee joints.

Fig. 9: Iliotibial band syndrome

v. CONCLUSION

In this paper, a proposed expert system was designed and developed using in Simpler Level 5 Object (SL5 Object) implemented in Delphi Embarcadero RAD Studio XE6 for efficiency and portability developed by Prof. Dr. Samy S. Abu Naser و in order to help physicians and parents in diagnosing the Hib problems in an easier and more precise way than before. This expert system is simple, fast and easy to use.

VI. FUTURE WORK

The expert systems will be used with electronic medical record systems and this allows for automated updates to be made to the patient's files, so that it's very clear and smooth about what the patient is there for and what their patient history has been without all the paperwork that will be required to go through. If it wasn't all an electron medical record system and this way the system can send out warnings on a patient and this would be based on the patient's past treatment medical history. This is basically all to try to keep the patient as safe as you can possibly keep them why should medical expert systems be you and this is because they have been proven to increase the quality of care delivered by medical personnel.

VII. EXPERT SYSTEM IN SIMPLER LEVEL 5 OBJECT (SL5 OBJECT) LANGUAGE:

```
!
! Written bu Basel Elhabil
!
ATTRIBUTE  Q1 Did you fall or suddenly feel your hip give way? COMPOUND Yes, No
ATTRIBUTE  Q2 Do the toes on the side of your injured hip seem to turn out? COMPOUND Yes, No
ATTRIBUTE  Q3 Do you have stiffness swelling redness or pain in any other joints? COMPOUND Yes, No
ATTRIBUTE  Q4 Have you felt a click in your hip or occasional pain with activity? COMPOUND Yes, No
ATTRIBUTE  Q5 Do you have pain in the back of your hib?  COMPOUND Yes, No
ATTRIBUTE  Q6 Is the person a child with pain in the knees hips or groin? COMPOUND Yes, No
ATTRIBUTE  Q7 Do you have pain in your hip that is also on the outside lateral part of your knee? COMPOUND Yes, No

ATTRIBUTE start SIMPLE

INSTANCE the domain ISA domain
  WITH start := TRUE

INSTANCE the application ISA application
 WITH title display := introduction
 WITH conclusion display :=  Conc

INSTANCE introduction ISA display
  WITH wait := TRUE
  WITH delay changes := FALSE
  WITH items [1 ] := textbox 1

INSTANCE textbox 1 ISA textbox
  WITH location := 10,10,800,350
  WITH pen color := 0,0,0
  WITH fill color := 100,200,100
  WITH justify IS left
  WITH font := "Arial"
  WITH font style IS bold
  WITH font size := 14
```

```
WITH text :="
                Hib Problems Diagnosis Expert System

                Written By Basel Elhabil

This Expert system is an example of Simpler Level 5 Object (SL5 Object) that
Demonstarte the use of some of the System calsses, Instances, Rules, etcc.

This Expert System diadnoses Hib Problems throgh a dialogue between
the System and the End User.

The Conclusion of the finding is displayed and an Advise is given
for the End User to solve the problem."



INSTANCE Conc ISA display
 WITH wait := TRUE
 WITH delay changes := FALSE
 WITH items [1] := title textbox
 WITH items [2 ] := problem textbox
 WITH items [3 ] := advise textbox

INSTANCE title textbox ISA textbox
 WITH location := 20,10,800,70
 WITH pen color := 0,0,0
 WITH fill color := 200,200,100
 WITH justify IS center
 WITH font := "Arial"
 WITH font style IS bold
 WITH font size := 14
 WITH text := " The Conclusion of the Hib Problems Diagnosis Expert System"

INSTANCE problem textbox ISA textbox
 WITH location := 20,110,800,130
 WITH pen color := 0,0,0
 WITH fill color := 170,170,170
 WITH justify IS center
 WITH font := "Arial"
 WITH font size := 14
  WITH text :=" --====--"


INSTANCE advise textbox ISA textbox
 WITH location := 20,280,800,130
 WITH pen color := 0,0,0
 WITH fill color := 170,170,170
 WITH justify IS center
```

WITH font := "Arial"

WITH font size := 14

WITH text :=" --===--"

RULE R0

IF start

THEN ASK Q1 Did you fall or suddenly feel your hip give way?

RULE R1

IF Q1 Did you fall or suddenly feel your hip give way? IS Yes

THEN ASK Q2 Do the toes on the side of your injured hip seem to turn out?

RULE R2

IF Q1 Did you fall or suddenly feel your hip give way? IS No

THEN ASK Q3 Do you have stiffness swelling redness or pain in any other joints?

RULE R3

IF Q2 Do the toes on the side of your injured hip seem to turn out? IS Yes

THEN

text OF problem textbox := "Your pain and deformity may be from a HIP FRACTURE."

AND text OF advise textbox := "URGENT Go to the closest emergency room."

RULE R4

IF Q2 Do the toes on the side of your injured hip seem to turn out? IS No

THEN ASK Q4 Have you felt a click in your hip or occasional pain with activity?

RULE R5

IF Q3 Do you have stiffness swelling redness or pain in any other joints? IS Yes

THEN

text OF problem textbox := "Your hip pain may be from ARTHRITIS."

AND text OF advise textbox := "Try an anti-inflammatory medicine."

RULE R6

IF Q3 Do you have stiffness swelling redness or pain in any other joints? IS No

THEN ASK Q4 Have you felt a click in your hip or occasional pain with activity?

RULE R7

IF Q4 Have you felt a click in your hip or occasional pain with activity? IS Yes

THEN

text OF problem textbox := "You may have a CONGENITAL HIP PROBLEM You may also have TROCHANTERIC BURSITIS."

AND text OF advise textbox := "See your doctor."

RULE R8

IF Q4 Have you felt a click in your hip or occasional pain with activity? IS No

THEN ASK Q5 Do you have pain in the back of your hib?

RULE R9

IF Q5 Do you have pain in the back of your hib? IS Yes

THEN

text OF problem textbox := "Your symptoms may be from SCIATICA a pinched nerve."

AND text OF advise textbox := "Heat, anti-inflammatory medicine, and rest may help."

RULE R10

IF Q5 Do you have pain in the back of your hib? IS No

THEN ASK Q6 Is the person a child with pain in the knees hips or groin?

RULE R11

IF Q6 Is the person a child with pain in the knees hips or groin? IS Yes

THEN

text OF problem textbox := "This could be SLIPPED CAPITAL FEMORAL EPIPHYSIS"

AND text OF advise textbox := "See your doctor."

RULE R12

IF Q6 Is the person a child with pain in the knees hips or groin? IS No

THEN ASK Q7 Do you have pain in your hip that is also on the outside lateral part of your knee?

RULE R13

IF Q7 Do you have pain in your hip that is also on the outside lateral part of your knee? IS Yes

THEN

text OF problem textbox := "You may have ILIOTIBIAL BAND SYNDROME."

AND text OF advise textbox := "Stretching and applying ice can help."

RULE R14

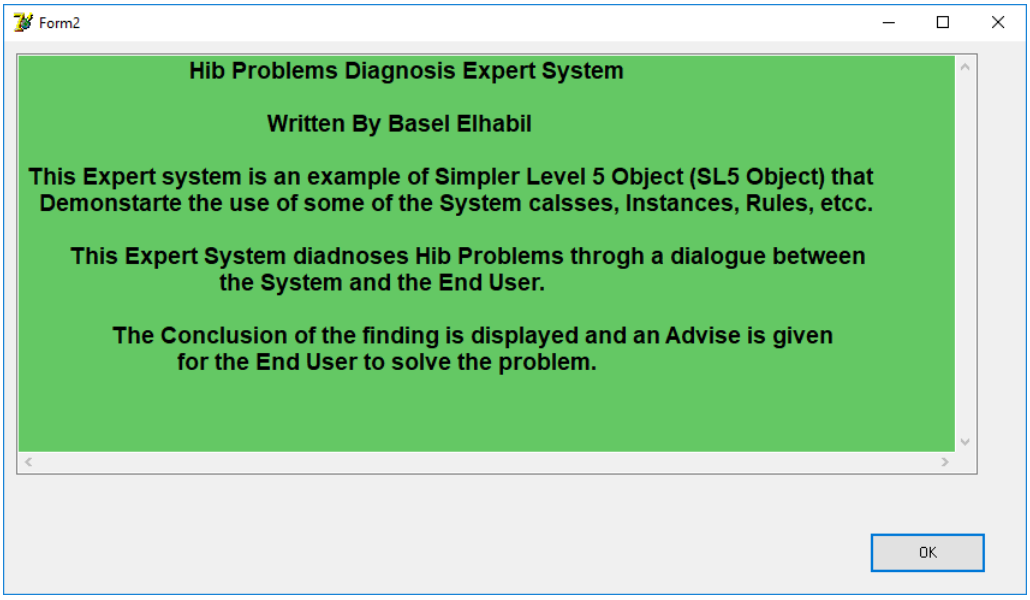
IF Q7 Do you have pain in your hip that is also on the outside lateral part of your knee? IS No

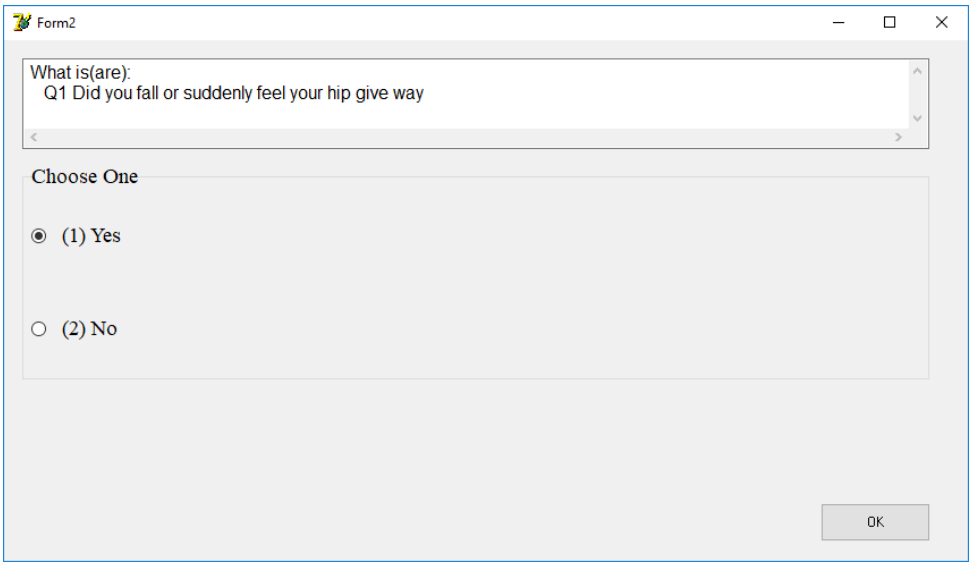
THEN

text OF problem textbox := " --===--"

AND text OF advise textbox := "please talk with your doctor."

END





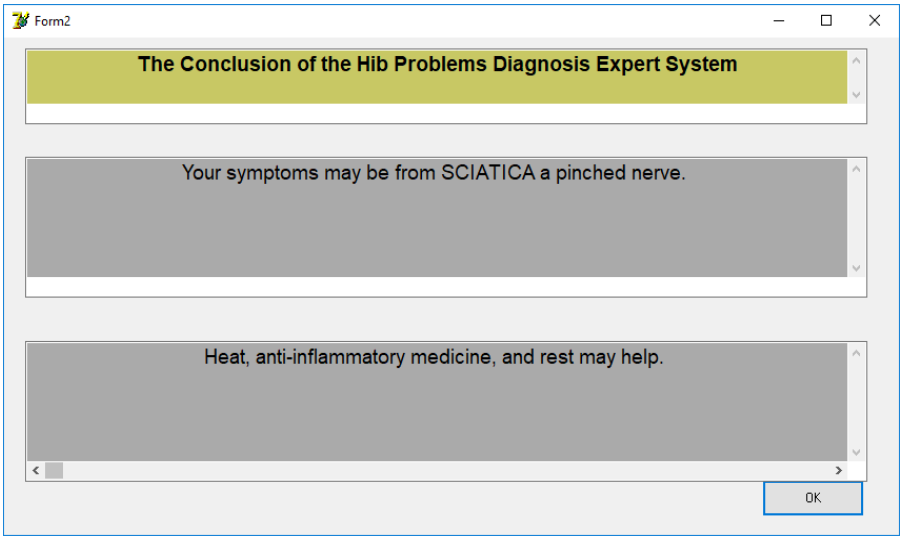


Fig.10: Some screen shots between the expert system and the end user

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