Expert System for Chest Pain Chronic Diagnosis and Treatment

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Abstract : *This study aimed to know the impact of the use of expert systems in managing cognitive data and we focus in this part on the medical field, which is one of the most beneficial areas of knowledge management, where we review the symptoms, causes and methods of treatment for chronic chest pain, and this study relied on the sources of data, whether The primary, which was built through the use of the clips program, and the secondary, which was built from some books and previous studies, the answers of some samples will be organized on a device through the program and illustrative pictures will be displayed. Chronic chest pain is a complaint that frequently prompts referral to pediatric cardiology clinics although very few pediatric patients with this symptom will be found to have cardiac disease. This review will discuss the common non-cardiac and cardiac causes of chest pain. Guidelines on the office management of this group of status based on program clips and doctor family website resources.*

Keywords: Expert System, Chest Pain, Chronic, Diagnosis

1. INTRODUCTION

Chronic chest pain is a common complication following thoracotomy, which is generally attributed to intercostal neuritis or neuralgia. Response to medical treatment is poor. We report a case of persistent chest pain following open lung biopsy, which was found to result from lung herniation, a rare, but surgically correctable complication of thoracotomy. Since lung herniation may be easily overlooked, this disorder should be considered more often in the differential diagnosis of persistent post thoracotomy chest pain.

Chest pain is one of the commonest reasons for consultation in primary care. Chest pain is usually mild and transient, but further management is required in some cases. These are of two main types-acute severe pain and persistent pain associated with distress and functional limitation. Acute central chest pain accounts for 20-30% of emergency medical admissions. Chronic chest pain is the commonest reason for referral to cardiac outpatient clinics.

Heart attack. A heart attack is caused by a blockage in the blood flow to the heart muscle, often due to a blood clot.

heart attack. Angina is a term that describes chest pain caused by poor blood flow to the heart. This often causes thick plaques to accumulate on the inner walls of the arteries that carry blood to the heart. These plaques narrow the arteries and limit the blood supply to the heart, especially during exertion.

2. EXPERT SYSTEMS

Expert system Is a program designed to simulate the intelligence of an expert in a particular field. It is mainly developed using artificial intelligence concepts, tools and technologies. An expert system is typically designed to provide capabilities similar to those of a human expert when performing a task.

Moreover, it can be used to drive vehicles, provide financial forecasts or do things that human experts do [9-14]. An expert system usually has two core components [15-25]:

1. Knowledge base -- This component consists of data, facts and rules for a certain topic, industry or skill, usually equivalent to that of a human expert.
2. Interference engine -- This component uses the facts and rules in the knowledge base to find and learn new knowledge or patterns.
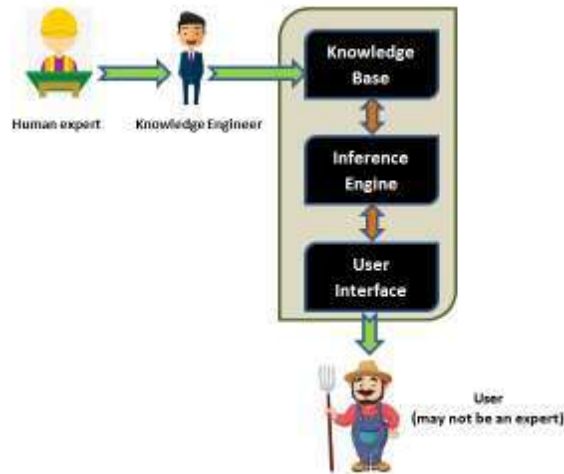
Figure 1: Expert System Architecture

3. MATERIALS AND METHODS

The proposed expert system performs diagnosis for 8 chest pain by displaying the symptoms. The proposed expert system will ask the user to choose the correct Symptoms of chest pain disease in each screen. At the end of the dialogue session, the proposed expert system provides the diagnosis and recommendation of the disease to the user [3-8].
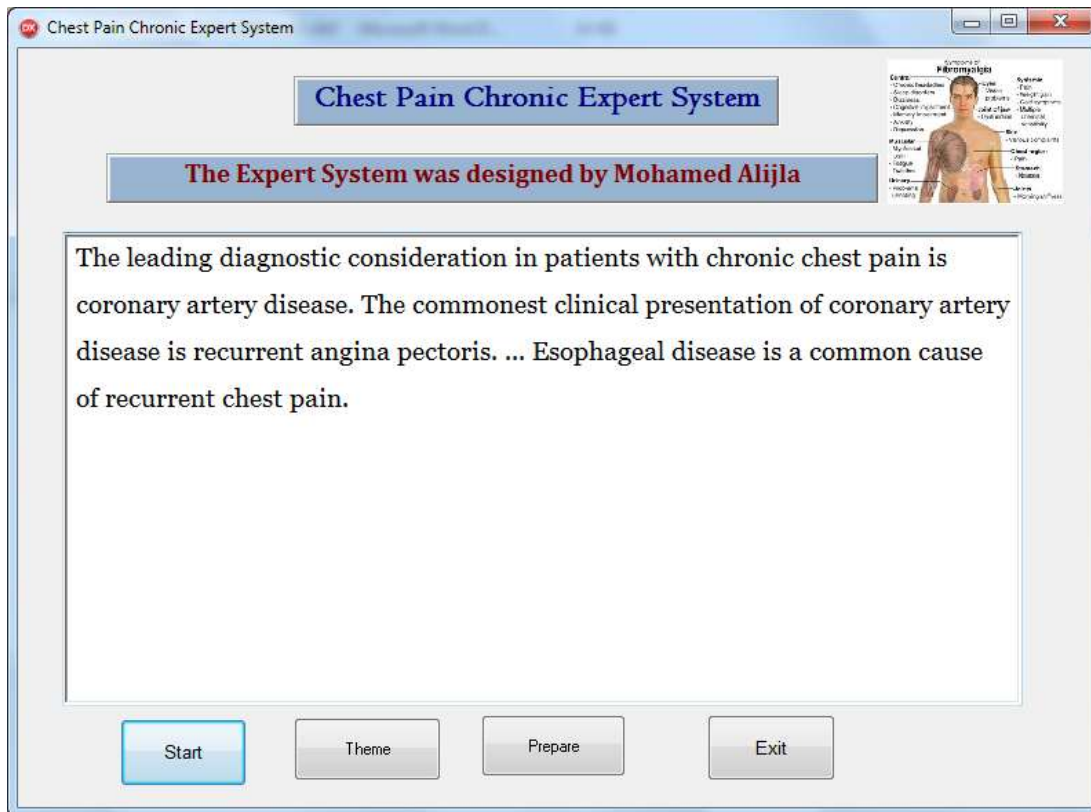

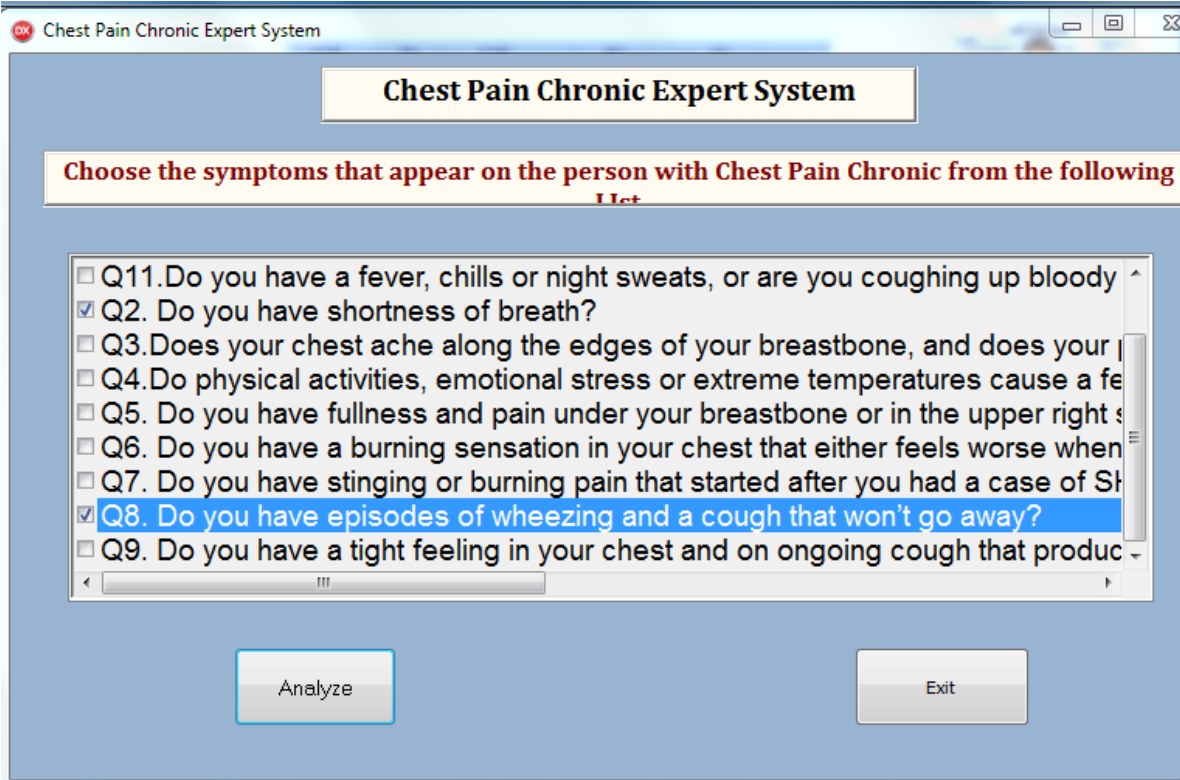Figure 2: Main user interface of chest pain disease
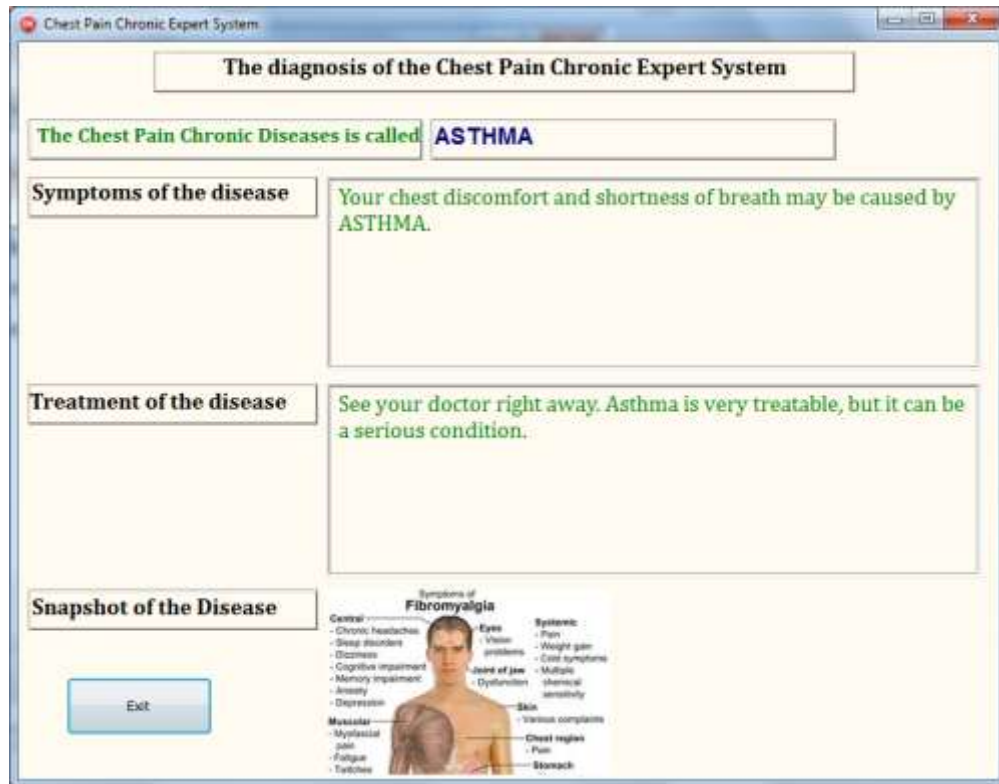
Figure 3: Symptoms of chest pain disease

Figure 4: Diagnosis and recommendations of chest pain disease expert system

4. LITERATURE REVIEW.

There is a lot of Expert System that were designed to diagnose human Diseases [31-43]. But there is no specialized expert system for diagnosis of Chest Pain diseases available free and Use a language CLIPS Linked with Delphi. This expert system was characterized to be easy to use by specialists and People concerned. This is due to the coordinated application interface. Some of these Expert Systems are specialized in one specific disease and others in 7 diseases. But the current proposed expert system is specialized in the diagnosis of 8 chest pain diseases.

5. KNOWLEDGE REPRESENTATION

The main sources of the knowledge for this expert system are medical doctors and specialized websites for chest pain diseases. The captured knowledge has been converted into CLIPS syntax. Currently the expert system has 23 rules which cover 8 diseases. Chest pain can cause digestive disorders, including:

- **Heartburn:**

   This painful burning sensation occurs behind the breastbone when the stomach fluid leaving your stomach is swept upward in the tube that connects the throat to the stomach (esophagus).

   Swallowing disorders. Esophageal disturbances can make it difficult to swallow but can make it painful.

   Gallbladder and pancreas problems. Gallstones, gallbladder or pancreatitis can cause stomach pain that extends to the chest.

- **Causes related to bones and muscles**

   Some types of chest pain are associated with injuries and other problems affecting the structures that form the chest wall, including:

   symptoms

   Chest pain may cause varying sensations, depending on the symptom. Often the cause is not related to your heart - however, there is no easy way to confirm this without seeing a doctor.

- **Causes of chest pain**

- **Heart related causes**
   Examples of causes of heart-related chest pain include:
   Especially the cartilage that connects the ribs to the breastbone, becomes inflamed and painful.
   Muscle pain. Chronic pain syndromes, such as fibromyalgia, can result in persistent muscle pain.
   Rib injuries. A broken or bruised rib can cause chest pain.

- **Lung related causes**

   Many lung disorders can result in chest pain, including:

   Pulmonary embolism. This occurs when the blood clot becomes stable in a lung artery (pulmonary), which blocks blood flow from reaching the lung tissue.

   Pleurisy. If the membrane covering the lungs becomes inflamed, it can cause chest pain that gets worse when you inhale the air or have a cough.

   Lung prolapses. Chest pain associated with a lung prolapse usually begins suddenly and can last for four hours, generally associated with shortness of breath. Lung prolapse occurs when air leaks into the area between the lung and the ribs.

Pulmonary hypertension. This condition occurs when you have high blood pressure in the arteries that carry blood to the lungs, which may cause chest pain.

- **other reasons**

    Chest pain can also be caused by:

    Costochondritis. In this case, the cartilage of the rib cage, and a bunch of pimples starting from the back to the chest wall.

Diagnosis

Chest pain does not always mean a heart attack. But this is what doctors will experience in the emergency room first because it is possibly the most urgent and severe threat to your life. They can also check for life-threatening lung conditions, such as a collapsed lung or a clot in the lung.

Immediate tests

Some of the initial tests a doctor can order include:

Electrocardiograph (ECG). This test records the electrical activity of the heart through the electrodes attached to your skin. Since the affected heart muscle does not conduct electrical impulses naturally, the EKG may show that you have or had a heart attack.

Blood tests. Your doctor may order blood tests to check for elevated levels of some proteins or enzymes naturally present in the heart muscle. The damage to heart cells caused by a heart attack may allow these proteins or enzymes to leak, within hours, into your blood.

Chest X-ray. A chest x-ray procedure allows doctors to check the condition of the lungs and the size and shape of the major cardiovascular system. Chest x-rays can also reveal lung problems such as pneumonia or a falling lung.

Computerized tomography (CT examination). Computerized tomography exams can determine the location of blood clots in the lung (pulmonary embolism) or make sure that you do not have aortic dissection.

Follow-up test

Depending on the results of these initial tests, you may need a follow-up test, which may include:

pharmaceutical

Panic attacks. If at times you feel intense fear accompanied by chest pain, rapid heartbeat, rapid breathing, extreme sweating, apnea, nausea, dizziness, and fear of death, you may have a panic attack.

Herpes zoster. Herpes zoster, caused by reactivation of the chickenpox virus, can cause pain

Echocardiogram. Echocardiography uses sound waves to provide a video image of your heart in motion. A small device can be passed down your throat to get better images of different parts of the heart.

Computerized tomography (CT examination). Various types of computerized tomography exams can be used to check for blockages of the arteries in the heart. Coronary angiography with computerized tomography can also be done with dye to check for blockages in the arteries of the heart and lung and other problems.

Stress tests.

It measures how well your heart and blood vessels respond to a feeling of stress, which may indicate whether chest pain is related to the heart. There are many types of stress tests. You may be asked to walk on a treadmill or switch on a stationary bike while you are connected to an EKG machine. Or, you can be given an intravenous drug to stimulate the heart in an exercise-like manner.

Coronary catheterization (angiography). This test helps doctors determine individual heart arteries that may be narrow or clogged. The arteries of the heart are injected with a liquid dye through a long, thin tube (catheter) that passes through one of the arteries,

either through the wrist or the groin, up to the arteries of the heart. By filling your arteries with the pigment, you become visible in X-rays and video.

Treatment

Treatment varies according to the cause of the chest pain.

Medications used to treat some of the most common causes of chest pain include:

Arterial relaxants. Nitroglycerin, usually taken in the form of a disc placed under the tongue, relaxes the arteries of the heart, so that blood can flow more easily across narrow distances. Some blood pressure medications also relax and expand the blood vessels.

Aspirin. If doctors suspect that chest pain is associated with the heart, you will likely be given aspirin.

Thrombolytic drugs. If you have a heart attack, you may receive these blood-thinning medications. It works to dissolve the clot that prevents blood from reaching the heart muscles.

Blood thinners. If you have a clot in one of the arteries supplying the heart or lungs, you will be given drugs that inhibit blood clots to prevent further clots from forming.

Acid inhibiting drugs. If chest pain is caused by stomach acid spreading to the esophagus, your doctor may suggest medications that reduce the amount of acid in your stomach.

Antidepressants. If you have a panic attack, your doctor may prescribe antidepressants to help you control your symptoms. Psychiatric treatment, such as cognitive behavioral therapy, may also be recommended.

6. THE ROLE OF TECHNOLOGY IN MEDICINE

In light of what was previously explained to this disease, expert systems play an important role in the management, transmission and retrieval of data defined here. We review the state of the disease through the clips program, which is one of the expert systems developed for knowledge management, the way this system works where this system provides you with the necessary recommendations based on the questions that Enter and observe the results as shown in Figure 1, 2 and 3.

7. CONCLUSION

The study aimed to identify the role of expert systems in the medical field, and the study adopted the descriptive analytical approach, and used chronic chest pain as a test case, and the clips program as an expert system.

The study reached several results, the most important of which was the recommended the importance of expert systems in the medical field.

It came in a great degree, and the quality of the recommendations came in a great way, and it became clear the importance of the existence and use of expert systems in all fields.

It turned out that there are no significant differences between the use of the human factor and the use of expert systems in terms of results, but with the other there is a large speed difference.

In light of the previous results, the study recommended the importance of relying on modern systems and developing them in a consistent manner.

With the needs of institutions, the importance of developing policies and strategies that increase the effectiveness of expert systems, and the necessity of having a specialized department, expert systems within the Information Technology Unit in the capacity of institutions and developing an intensive and continuous training program on the use of expert systems to reach the desired goal.

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