EXPERT SYSTEM FOR DIAGNOSING HIV/AIDS USING AYURVEDA THERAPY (HIVESAT)

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Abstract
This paper explains Expert system (ES) for diagnosing HIV/AIDS by using Ayurveda Therapy. This Expert System will be a stand alone system which will implement the Knowledge Base and usage of Inference logic. Using this and on the basis of symptomatology and pathological findings, this system is going to infer the prescription for the HIV patient. This paper explains how to use ES that will help to formulate the base for immunization system.

Keywords
HIV/AIDS, Ayurveda, Expert system, Case Based Reasoning.

1. INTRODUCTION
NOWADAYS, Medicine is one of the sectors where Artificial Intelligence is widely used for diagnosis and treatment of diseases. In spite of advancement in this field, this disease still remains a challenge to the physician today. The problem with HIV treatment is the complexity for diagnosing & drug administration. Wrong drug administration can become expensive for the patients. So, this system will achieve this task effectively, by cooperating with the physician with suitable statistical study of the symptoms found out on several patients by using Ayurveda Therapy. Lisp language will be chosen for achieving this goal.

1.1 Basic purpose of Ayurveda for HIV/AIDS
AIDS (Acquired Immuno Deficiency Syndrome) is caused by a virus which is a type of Human T cell Leukemia Lymphoma Virus (HTLV). Acquired means it is not inherent but is transmitted by another person who is infected. Immune means the capacity of the person to withstand diseases. Deficiency means diminished condition. Syndrome means the disease is a group of symptoms and not a specific disease.

The main mark of this infection is the reduction of CD4+T cell count and breakdown of immunity of body. In Ayurveda immunity means “Ojas”. The standard laboratory test for HIV infection in all Allopathy, Ayurveda, Homeopathy and Unani is the ELSIA (Enzyme Linked Immuno Sorbent Assays) test which can detect both HIV1 and HIV2 with a sensitivity of over 99.5%. The confirmation test that is used is “Western Blot” test.

“Bala” is used for physical strength in Ayurveda. According, to Ayurveda, the loss of Ojas leads to degeneration and wasting of the body. Thus, to maintain immunity against the disease a variety of Rasayana drugs has been described in Ayurveda. When the immunity increases the latency period of the HIV +ve patient increases and their quality of life is improved.

1.2 Expert System
It is the most important branch of AI. The Inference Engine of an Expert System uses the knowledge base and produces inferences.

For making up an Expert System knowledge acquisition is used to obtain domain knowledge about the application. The process of building an Expert System is called knowledge engineering and is done by a knowledge engineer. Development of an Expert System continues until the performance of the system is found satisfactory by the expert.

1.3 Objective of the paper
The main objective of the paper is to explain the usage of Expert System for prescribing medicines for HIV/AIDS patient using Ayurveda therapy which will increase patient’s immunity and as a result the latency period.

2. IMMUNIZATION SYSTEM

2.1 Usage of ES for Immunization System
Diagnostic and therapeutic guidance is given after the
system receives information from the doctor about the patient. A medical expert system is based on a large number of facts and rules about this sickness in order to provide proper solutions. Expert Systems consist of a sequence of steps for coming to a conclusion. From these sequences of steps of inference is done in order to create rules. Validation processes ensure the accuracy of conclusion provided by this expert system.

Some applicable rules are

1. If the patient requires ART therapy then
   I. Provide the list of possible therapies
   II. Determine the best therapy.
   Else
      Indicate the patient to go for Allopathic treatments.

2. (Using or condition-Cure)
   If the count of cd4+T cell count is low then
   the following drugs are recommended .
   I. Drug1
   II. Drug2.

3. (Using and condition-Diagnosis)

   If Symptom1 is present and Symptom2 is present then
   there is evidence that the person is HIV infected.

   Thus some of the factors that the expert system will consider are
   1. Age, Weight, Sex of patient
   2. Count of the HIV virus.
   3. Cd4+T cell count
   4. Likely effectiveness of the antiviral agents.
   5. Oral Administration and dosage of drugs.

   Problems which occur normally during drug presciption without an expert system are
   1. Over dosage of drugs
   2. Wastage of Money
   3. Improper medication can make the HIV virus resistant to the drug.

Uses of HIVESAT
1. Things become more efficient by reducing the time needed to work out problems.
2. Solutions are made available for decisions and recurrent tasks.
3. Combine various human expert intelligences.
4. Store huge amount of data.

2.2 Better immunization System will help to cure HIV

According to the Ayurveda there are two causative factors for AIDS –

a. The External cause: HIV
b. The Internal cause: Ojakshaya i.e. Immuno deficiency

The HIV infection leads to breakdown of immunity of the body.

The concept of immunity or Vyadhikshamta happens to be one of the many significant concepts developed in Ayurveda in view of prevention and recovery from diseases.

In Ayurveda, it is the ‘Ojas’ that has been considered to play a vital role in defense mechanism of the body. Generally, the term ‘bala’ is used for physical strength but in Ayurveda, it also signifies body resistance which is the synonym of ‘Ojas’. The ‘Ojas’ is not only a source of energy but also a factor of resistance. The factors lowering down the defense mechanism of the body are

The lowered ‘Bala’ or ‘Ojas’ can be enhanced by means of nutritive diet, proper mode of life activities and certain vitalizing (Urjaskara) medicines like Rasayana and Vajikaran etc.

Drugs, diet and regimens, which promote longevity by preventing ageing and diseases, are called Rasayana or rejuvenation therapy.

A person undergoing this therapy attains longevity, memory, intellect, freedom form diseases, youth, excellence of luster, complexion and voice, excellent potentiality of the body and sense organs, vak-siddhi, respect and brilliance.

3. Description of the HIVESAT system

3.1 Methodology

The CBR method (Case Based Reasoning) will be used. This system is still under construction and it is written in expert system tool CLIPS which run under the Microsoft Windows environment and the user interface was created using Visual Basic Dot Net. The user interface has forms which are to be
filled up by physician while diagnosing the patient. And user interface will interact with knowledge base.

Forward chaining: If the chaining starts from a set of conditions and reaches a conclusion then this process is called as forward chaining. Since our system is going to infer the appropriate drug on the basis of the symptoms and pathological findings that means we are trying to reach the goal on the basis of facts therefore we have to use forward chaining, which can be implemented by using LISP. These methods are put together into program modules called inference Engines that use the knowledge base to form line of reasoning.

3.2 Design of an Expert System

The core components of Expert Systems are the knowledge base and the reasoning engine. A knowledge base has been created which contains 3 different components.

First Component deals with the general patient information and symptoms.
Second component deals with diagnosis of the virus, on the basis of pathological findings and symptoms.
Third component deals with the treatment of the disease.

4. Conclusion

Thus it can be concluded that although the external cause of AIDS is HIV infection but its internal cause is Ojakshaya (decreased immunity) which is mainly responsible for the disease. Therefore a deadly disease like ‘AIDS’ can be cured with the help of herbal drugs and the proper drug can be prescribed by this expert system.

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