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KNOWLEDGE BASED SYSTEM FOR THE DIAGNOSIS OF DENGUE DISEASE

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Abstract: **Background:** Dengue Disease is a mosquito-borne tropical disease caused by the dengue virus, symptoms typically begin three to fourteen days after infection. This may include a high fever, headache, vomiting, muscle and joint pains, and a characteristic skin rash. Dengue serology is applied in different settings, such as for surveillance, in health care facilities in endemic areas and in travel clinics in non-endemic areas. The applicability and quality of serological tests in dengue endemic regions has to be judged against a background of potential cross reactivity with other flavi-viruses, difficulties in distinguishing primary from secondary infections and technological problems related to the fact that most dengue endemic regions are relatively poor of resources .**Objectives**: to help doctors and patients in diagnosing Dengue Disease and give them the information of how to prevent Dengue Disease and to be able to understand the signs and symptoms of Dengue Disease. **Methods:** We collected all relevant material for Dengue Disease. Then we designed and implemented a knowledge based system for diagnosing Dengue Disease using SL5 Object Language. **Results:** The knowledge based system was evaluated by a group of Patients and specialized doctors and they found it very friendly and easy to use.

Keywords: Expert System, SL5, Delphi, Dengue, Diseases

1. INTRODUCTION

Dengue is an infectious disease caused by a virus. The virus is transmitted by a type of mosquito (Aedes aegypti) that bites during daylight hours. The dengue virus belongs to the Flaviviridae family of viruses that cause diseases in humans. Dengue is the most common infection caused by viruses transmitted by mosquitoes these are known as arboviral illnesses. Dengue causes severe flu-like symptoms, such as ahigh temperature (fever) of 40C (10F)or over , severe headache muscle and joint pain and facial flushing and skin rash. The growing global health burden of dengue disease and the ongoing challenges in developing vaccines and drugs against this infection have underscored the need for better models to elucidate the mechanism of dengue pathogenesis and evaluate interventions before large field efficacy trials. If successful,

a DHIM could be used to study clinical and immunologic pathogenesis, explore virus-vector- host interactions, and inform vaccine and drug developers as they make development decisions. A DHIM could facilitate vaccine immunogenicity assay development and the optimization, qualification, and validation processes required for these assays to support regulatory strategies and product licensing applications. It could also help define a correlate and surrogate of protection, and once drug or vaccine safety and efficacy was proven in field testing in endemic settings, it could assist the process of bridging these data to nonendemic populations who may benefit from a therapeutic[1,2,3].

2. EXPERT SYSTEMS IN HEALTH:

An expert system is a computer system that emulates the decision making ability of a human expert[11- 15]. By so doing, it acts in all respects like a human expert, using human knowledge to solve problems that would require human intelligence[16-20]. When patients seek the help of medical experts, they do so for diagnosis and treatment of their various health problems. This can also be to confirm a clinically suspected diagnosis or to obtain more accurate information. For example, in the developing countries where malaria is endemic and commonly associated with the "factor of developing" called poverty, the malaria disease may be suspected by the presence of fever. However, because of the presence of many other diseases causing fever, confirming the diagnosis of malaria may be difficult, unless by the exclusion of other causes of fever on history, physical examination and on microscopic examination of a blood slide[4,5].

3. DIFFERENT MOSQUITO BORNE DISEASES :

Here we describe the origin of different mosquito born disease. These diseases have some common symptoms with others. Some are viral while other are non-viral. Viral diseases are either due to mosquitos like Yellow fever, Malaria, Dengue and influenza, whereas non-viral are natural diseases such as heart diseases, diabetes and cancer. Unlike non-viral diseases, the viral diseases can spread in short spans of time and are difficult to handle. Fig. 2 expresses hierarchical structure of viral and non-viral diseases

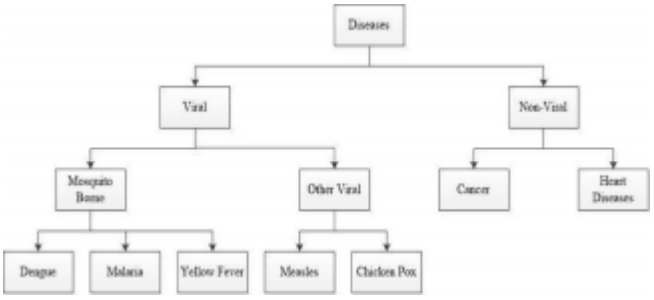

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Fig. 1. Viral and non-viral diseases.

A. Diseases Due to Mosquitos

These diseases are caused by viruses that are transmitted by mosquitos. Which includes Dengue, Yellow Fever and Malaria.

In past years' research shows that there is leap in diseases caused by mosquitos. This motivates researchers and scientists to work to reduce these diseases Fig. 3 presents complete detail of mosquitos borne diseases[1-3].

1)Yellow Fever: It is one of the infectious diseases which is caused by Aedes mosquito that is infected by Flavivirus. This mosquito is usually found in sub-tropical or tropical regions

Signs and Symptoms: Yellow Fever happens due to a virus cause by mosquito. The symptoms appear in 3 to 6 days after mosquito bite. There are three stages of this disease

Stage 1 (infection): The infected person shows following symptoms in first 3 to 4 days, fever, loss of appetite, headache, joint pain, vomiting and jaundice. After day 4 these symptoms become brief

Stage 2 (remission): In this stage, most of the symptoms are gone and people can be recovered but due carelessness the situation can get even worst

Stage 3 (intoxication): In organs such as liver, heart and kidney different problems may occur.

2) Malaria: Malaria is also a disease that happens due to virus by a female mosquito Plasmodium of genus Anopheles carry. If this disease is not treated in time it may lead to complications towards death. There are two types of malaria in general: simple and severe. Simple malaria is curable if treated within time while severe malaria may lead to death.

Signs and Symptoms :

Simple Malaria: This disease remains for 6 to 10 hours Its symptoms are, cold stage that has sense of shivering, hot stage with headache and vomiting and sweating stage. Attacking schedule is with Tertain parasite, it occurs every second day & with Quartan parasite it occurs every third day. General symptoms are: Fever, Headache, Sweating, Vomiting, Body ache and Chills. The physical impact of malaria can be seen on the infected body that includes, getting sweaty, temperature rise up, mild jaundice, respiration increased and weakness in body . Severe Malaria: During simple malaria if there arise a complication of infection in any part of body by failure of any organ it may create severe malaria

3) Dengue: Aedes aegypti is certain type of mosquitos that causes of Dengue. It is a viral disease and the virus is single- positive strand RNA virus and commonly found in subtropical and tropical regions.

Signs and Symptoms: Major symptoms of Dengue are high- fever and combination of at least two which are, Pain in joints, Bleeding gums, Rashes on skin, Very low white- blood cells, Pain in bones and severe pain behind eyes. To get better a proper lookout is very necessary because after 3 to 7 days following things can happen, Red spots on body, Pale skin, Drowsiness, Pain in abdomen, Breathing in difficult. Dengue Disease that stays for 2 to 7 days is normally called Dengue Hemorrhagic Fever (DHF). DHF warning appears when after 24 to 48 hours fever suddenly drops and at this time bleeding is started, due to this circulatory system is disturbed and it may lead to death.

World Health Organization (WHO) has worked on the Dengue risk factors that play the pivotal role in the disease diagnosis . Similarly, resources have showed that Dengue is assorted disease, its symptoms are mixed with other diseases that make its detection and diagnosis more difficult .

Dengue is the most important arthropod-borne viral disease of public health significance. Compared with nine reporting countries in the 1950s, today the geographic distribution includes more than 100 countries worldwide. Many of these had not reported dengue for 20 or more years and several have no known history of the disease. The World Health Organization estimates that more than 2.5 billion people are at risk of dengue infection. First recognized in the 1950s, it has become a leading cause of child mortality in several Asian and South American countries.

Fig. 2. Mosquitos.

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people are at risk of dengue infection. Most will have asymptomatic infections. The disease manifestations range from an influenza-like disease known as Dengue Disease (DF) to a severe, sometimes fatal disease characterized by haemorrhage and shock, known as dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS), which is on the increase. Dengue Disease and dengue haemorrhagic fever/dengue shock syndrome are caused by the four viral serotypes transmitted from viraemic to susceptible humans mainly by bites of Aedes aegypti and Aedes albopictus mosquito species. Recovery from infection by one serotype provides lifelong immunity against that serotype but confers only partial and transient protection against subsequent infection by the other three. First recognized in the 1950s, it has become a leading cause of child mortality in several Asian and South American countries[3].

The average number of DF/DHF cases reported to WHO per year has risen from 908 between 1950 and 1959 to 514,139 between 1990 and 1999. The real figure is estimated to be closer to 50 million cases a year causing 24,000 deaths. Of an estimated 500,000 cases of DHF/DSS requiring hospitalisation each year, roughly 5% die according to WHO statistics. Regional distribution of dengue and its serotypes are described elsewhere. In summary, DF/DHF/DSS is an immediate problem in south and southeast Asia and Central and South America. Although DF is present in the African region, there are no cases or outbreaks reported to WHO[1].

Half the world's population lives in countries endemic for dengue, underscoring the urgency to find solutions for dengue control. The consequence of simple DF is loss of workdays for communities dependent on wage labour. The consequence of severe illness is high mortality rates, since tertiary level care required for DHF/DSS management is beyond the reach of most of the persons at risk. This paper reviews the changing epidemiology of the disease, focusing on host and societal factors and drawing on national and regional journals as well as international publications. It does not include vaccine and vector issues. Although each one of the issues taken up below merits an independent, in-depth treatment, we have selected only those issues where the literature raises challenges to prevailing views and therefore require further research, particularly given that most of these issues are key for improved service delivery in poor countries[2].

CONCLUSION:

We collected all relevant material for Dengue Disease. Then we designed and implemented a knowledge based system for diagnosing Dengue Disease using SL5

Object Language. The knowledge based system was evaluated by a group of Patients and specialized doctors and they found it very friendly and

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