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Stroke Risk Analysis and Evaluation Using Web Applications

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ABSTRACT: Stroke risk analysis and evaluation using web applications mainly focuses on a disease which is one of the leading causes of death in India. This application determines the chances of one getting stroke in the next 10 years using ASCVD(Atherosclerotic Cardio Vascular Disease)algorithm.It also uses Pooled Cohort Equation. This web application include PHP, JavaScript, JQuery, HTML5 and CSS3. Stroke can occur due to a variety of reasons, some of them being high blood pressure, high cholesterol, diabetes, and those who smoke. So based on the causes mentioned and some other parameters we can find the probability of one getting stroke in 10 years. The user needs to have a phone or a laptop with internet accessibility. Since it is a web application it is very easy to access from anywhere around the world with a stable network connection. Once the user enters the website basic information about stroke is provided to them. The user can then access the stroke risk evaluation form using the link on the homepage. Now the user can fill the details such as ethnicity, age, gender, blood pressure, and other details. Once they submit the form they are taken to the result page where the user's chance of getting stroke is calculated and displayed along with an appointment form. This appointment form will get the user details if they wish for a check-up. If the user's risk is high and if they want to start the treatment immediately the appointment can be directly fixed with the help of the form. Hospital's office will be notified by mail once the appointment form is submitted. The user can start the treatment directly without any issues and his medical records are maintained for further studies. Thus stroke risk analysis and evaluation concentrates mainly on bringing an awareness about stroke to each and every people.

KEYWORDS: ASCVD, Pooled Cohort equation, PHP

I. INTRODUCTION

A web application is an application software that runs on a web server, unlike computer-based software programs that are stored locally on the Operating System of the device. Web applications are accessed by the user through a web browser with an active internet connection.

Web applications can be designed for a wide variety of uses and can be used by anyone; from an organization to an individual for numerous reasons. Some Web apps can be only accessed by a specific browser; however, most are available no matter the browser.Web applications do not need to be downloaded since they are accessed through a network. Users can access a Web application through a web browser such as Google Chrome, Mozilla Firefox or Safari.For a web app to operate, it needs a Web server, application server, and a database. Web servers manage the requests that come from a client, while the application server completes the requested task. A database can be used to store any needed information. This Web application is written using HTML5, and Cascading Style Sheets (CSS). Client-side programming typically utilizes these languages, which help build the website's front-end. Server-side programming is done to create the scripts a Website will use. Server-side programming is written using PHP. PHP is a general-purpose scripting language, in which case PHP

generally runs on a web server. Since the backend of the website performs calculations and interacts with the user PHP is used to create dynamic web page content on the website. Any PHP code in a requested file is executed by the PHP runtime. Along with PHP Javascript is also used in the backend of the website. JavaScript is a text-based programming language used both on the client-side and server-side that allows you to make web pages interactive. Where HTML and CSS are languages that give structure and style to web pages, JavaScript gives web pages interactive elements that engage a user.

II. LITERATURE SURVEY

A literature review is a body of text that aims to review the critical points of current knowledge on and/or methodological approaches to a particular topic. It is secondary sources and discuss published information in a particular subject area and sometimes information in a particular subject area within a certain time period. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area and precedes a research proposal and may be just a simple summary of sources. Usually, it has an organizational pattern and combines both summary and synthesis.

Title : A Systematic literature Review of Risk Factor for Stroke in China
Author: Huoyong, Joanne foody, Zhao Dong
Year :2012

Other countries have seen a decline in stroke incidence after improved treatment and prevention of known risk factors for stroke. China is still experiencing significant increases in the incidence rate of total stroke. We systematically reviewed the evidence on the impact of five modifiable risk factors (hypertension, dyslipidemia, obesity, diabetes, and smoking) for the risk of stroke in the Chinese population, with the aim to develop more effective prevention and disease management programs. A literature search was conducted in MEDLINE and EMBASE for all observational studies that reported on the association between risk of stroke and any of the five risk factors as well as the composite risk factor. Selected articles were published in either English or Chinese from January 2004 to December 2010. Evidence of the association between hypertension and stroke was the strongest of the five factors reported in studies, with adjusted odds ratios ranging between 2.75 and 5.47. The association between obesity, diabetes and smoking, and the risk for stroke was evident, but not as strong as for hypertension. The risk ratios of hypertension to stroke were higher in the Chinese population than in other countries.

Title: A Systematic Literature Review of Patients With Carotid Web and Acute Ischemic Stroke

Author: Andrew J. Zhang, Parth Dhruv, Philip Choi,Caitlin Bakker

Year :2018
Abstract

Background and Purpose: Carotid web (CW) is a rare form of focal fibromuscular dysplasia defined as an abnormal shelf-like projection of intimal fibrous tissue into the carotid bulb. It is theorized that CW leads to ischemic stroke secondary to blood flow stasis and subsequent embolization. The natural history and optimal management of CW are unclear. To address this knowledge gap, we performed a systematic literature review (SLR) of CW.

Methods: Our librarians performed a SLR for CW and related terminology. Patient-level demographics, stroke risk factors, neuroimaging findings, stroke recurrence or stroke free-duration, and treatment modality were extracted. We used descriptive statistics to characterize our results. When specific patient-level metrics were not reported, the denominators for reporting percentage calculations were adjusted accordingly.

Results: Our literature search produced 1150 articles. Thirty-seven articles including 158 patients (median age 46 years [range 16–85], 68% women, 76% symptomatic) met entry criteria and were included in our SLR. Of the symptomatic CW patients: 57% did not have stroke risk factors, 56% who received medical therapy had recurrent stroke (median 12 months, range 0–97), and 72% were ultimately treated with carotid revascularization (50% carotid stenting, 50% carotid endarterectomy). There were no periprocedural complications or recurrent strokes in carotid revascularization patients.

Conclusions: CW leads to ischemic stroke in younger patients without conventional stroke risk factors. We found a high stroke recurrence rate in medically managed symptomatic CW patients, whereas carotid revascularization effectively prevented recurrent stroke. Our findings should be interpreted with caution because of risk of publication and reporting bias.

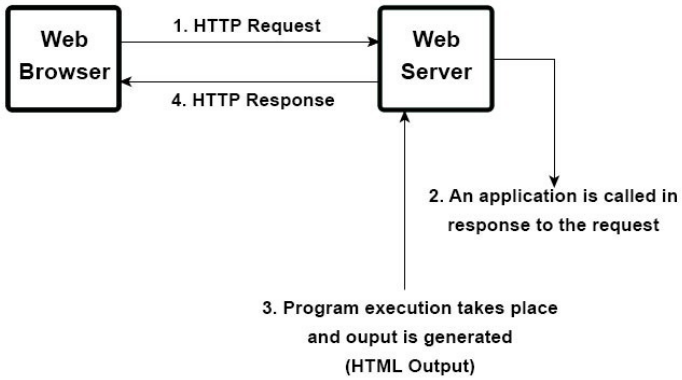
III. PROPOSED METHODOLOGY AND DISCUSSION

The proposed system allows the people to check their own chance of getting a stroke with a help of a few questions. The user has to answer a set of questions which are available in the website. Once the user answers the questions they will get to know their chances of getting a stroke in 10 years. People are asked about their age, gender, ethnicity, bp, whether they smoke, whether they have any heart problem, etc,. With the help of these questions we can find the probability of one getting stroke in 10 years. Since this is available on a website anyone around the world with a stable internet can assess their risk. The user need not enter any personal information such as their name, address, phone number. They can simply calculate their risk with very simple questions.

The result can be classified into 3 types: 1. Low Risk, 2. Medium Risk, 3. High Risk. All the users come under anyone of the above category based on their individual result. This can help a lot of people as it predicts the probability in 10 years. The website also provides information about the symptoms, risk factors, and preventive measures.

Advantages:

1. This system finds the 10 year probability of one getting stroke.
2. This system does not require any personal information from the user in order to fill the form.
3. It also provides an appointment form which makes consultation easier.
4. Since it is a website it is widely available to everyone with the internet.
5. .No installation is required. The user can directly access the service through any web browser.



Process: Stroke Risk Analysis and Evaluation works as follows:

1. The user enters the site from any browser such as Chrome or Firefox. Once the user enters the site, they are provided with the basic information about stroke such as common symptoms, precautionary measures and so. Then the user is provided with a link which is linked to the assessment form. Once the user clicks on the link they get a form.
2. The form is displayed to the user. The user has to answer every single question asked because the calculator does not work if they fail to answer even a single question. Once the user fills the form they can submit the form only then the calculation work starts.
3. The calculator uses (i) ASCVD algorithm, and (ii) Pooled Cohort Equation to calculate the user's risk probability for 10 years. It is based on a few parameters such as Ethnicity, Age, Gender, Systolic BP, Diabetic or not, Smoker or not, Heart problems. The result for the user completely depends on these parameters.

4. Once the result is displayed the user can check their risk status whether it is high, moderate or low. All the users fall under these 3 categories based on their risk status.
5. The result screen also provides an appointment form, which the user can fill for booking an appointment if they wish an immediate consultation. If the user fills the appointment form they will be notified by a mail or a message to their phone that the booking is confirmed.

IV. EXPERIMENTAL RESULTS

Consider the following inputs fed into the system and let's discuss the outcomes of these events in different scenarios. The output of the system depends on these parameters namely,

1. Ethnicity
2. Age
3. Gender
4. Systolic Blood pressure
5. Whether the user is diabetic or not
6. Whether the user is a smoker or not
7. Any cases of heart problems
8. Sedentary lifestyle

The system is efficient when the network quality is high. The prediction completely depends on the parameters mentioned above. All these parameters are very vital in order to determine the 10 year probability of one getting stroke. Hence each and every parameter must be filled by the user in order to obtain the result. The result is categorised into (i) High Risk, (ii) Medium Risk, and (iii) Low Risk. All the users fall under these 3 categories based on their individual result.

Test Case Identifier	Input	Expected Output	Obtained Output	Pass/ Fail Criteria
TC01	Asian, Age - 56, Male, 116 - 125, Not Diabetic, Not a smoker, Nil heart problems	Your risk for stroke is Low	Your risk for stroke is Low	Pass
TC02	African, Age-63, Male, 130 - 135, Diabetic, Not a smoker, Nil heart problems	Your risk for stroke is Low	Your risk for stroke is Low	Pass
TC03	Caucasian, Male, Age-57-59, High BP, Diabetic, Smoker, Sedentary Lifestyle	Your risk for stroke is High	Your risk for stroke is High	Pass

The test log is prepared by the person executing the test. It's a diary of events that takes place during the test. It supports the concepts of a test as a repeatable experiment. The test log is invaluable for use in defect repair. It gives the developer a snapshot of the events associated with a failure. Test log in combination with incident test report which should be generated in case of anomalous behavior, gives valuable clues to the developer whose task is to locate the source of the problem.

The test log contains:

- Test log Identifier
- Description

- Activity and Event entries
    - Execution description
    - Procedure results
    - Environmental information
    - Anomalous events
    - Incident report Identifier

Test Log Identifier	Description	Activity and Event Entry
TL01	Problem in calculation when the gender is chosen as female	Modified the code. Test Incident Report Identifier(TIR01)

The tester should record in a test incident report or problem report of any event that occurs during the execution of the tests that is unexpected, unexplainable, and that requires a follow up investigation. The test incident report contains:

- Test Incident Report Identifier
- Summary
- Incident description
- Impact

Test Incident Report Identifier	Summary	Incident Description	Impact
TIR01	Problem with result generation	Fails to display result if female is chosen in gender	Severe

V. CONCLUSION

The concluded Web Application provides user about his/her risk level of Stroke. The risk level is calculated based on the details given by the user. This is calculated by the stroke calculator which uses ASCVD algorithm. This algorithm predicts the risk level of Stroke within a 10 year period. In addition to this the user will be educated on the various treatment options available based on their result.

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