**CHAPTER ONE**

**1.0 INTRODUTION**

**1.1 BACKGROUND OF STUDY**

Sickle cell anemia is one type of anemia. Anemia is a condition in which your blood has a lower than normal number of red blood cells. This condition also can occur if your red blood cells don't contain enough hemoglobin. Sickle cell anemia is the most common form of sickle cell disease (SCD). SCD is a serious disorder in which the body makes sickle-shaped red blood cells. Sickle-shaped‖ means that the red blood cells are shaped like a crescent. Normal red blood cells are disc-shaped and look like doughnuts without holes in the center. They move easily through your blood vessels. Red blood cells contain an iron-rich protein called hemoglobin. This protein carries oxygen from the lungs to the rest of the body. Sickle cells contain abnormal hemoglobin called sickle hemoglobin or hemoglobin S. Sickle hemoglobin causes the cells to develop a sickle, or crescent, shape. Sickle cells are stiff and sticky. They tend to block blood flow in the blood vessels of the limbs and organs. Blocked blood flow can cause pain and organ damage. It can also raise the risk for infection.Fig.1 show normal and abnormal sickle shape red blood cell. Red blood cells are made in the spongy marrow inside the larger bones of the body. Bone marrow is always making new red blood cells to replace old ones. Normal red blood cells live about 120 days in the bloodstream and then die. They carry oxygen and remove carbon dioxide (a waste product) from your body. In sickle cell anemia, the abnormal sickle cells usually die after only about 10 to 20 days. The bone marrow can't make new red blood cells fast enough to replace the dying ones. Sickle cell anemia is an inherited, lifelong disease. People who have the disease are born with it. They inherit two genes for sickle hemoglobin one from each parent. People who inherit a sickle hemoglobin gene from one parent and a normal gene from the other parent have a condition called sickle cell trait

Figure 1(A) shows normal red blood cells flowing freely in a blood vessel. Figure1 (B) shows abnormal, sickled red blood cells blocking blood flow in a blood vessel.

Sickle cell trait (SCT) is different than sickle cell anemia. People who have sickle cell trait don't have the disease. People with SCT usually do not have any of the symptoms of SCD and live a normal life, but they can pass the sickle cell gene on to their children. When both parents have SCT, they have a 25% chance of having a child with SCD with every pregnancy. When both parents have SCT, they have a 50% chance of having a child with SCT with every pregnancy. Sickle cell anemia has no widely available cure. However, prior or in time treatments to improve the anemia and lower complications can help with the symptoms and complications of the disease in both children and adults. Sickle cell anemia varies from person to person. Some people who have the disease have long-term pain or tiredness. However, with proper care and treatment, many people who have the disease can have improved quality of life and reasonable health much of the time. Because of earlier and in time starts treatments and care, people who have sickle cell anemia are now living into their forties or fifties or longer. In diagnosing of a disease, physicians make decisions about the type of disease based on the symptoms and by studying the history of the patients.

**1.2 STATEMENT OF PROBLEM**

(i) The difficulties in detecting some sicknesses.

(ii) Complex system of human being.

(iii) Inability of Doctors to know the actual cause of disease.

(iv) Risk involve in prescribing drugs based on assumption.

The need for these problems gave rise for the development of Computer based information system that diagnoses on sickle cell anemia, to enable doctors solve these problems.

**1.3 AIM OF STUDY**

This project aimed at developing a computer based information system that improves in the diagnosis of sickle cell anemia.

**1.4 OBJECTIVES OF STUDY**

The aims and objectives of this project are listed below:

* Increase the awareness and understanding of the value of sickle cell anemia diagnosis system
* Achieve efficient and reasonable regulation of sickle cell diagnosis technologies
* Interact with appropriate government agencies on reimbursement and technology assessment policies
* Improve regulatory harmonization of the global market for sickle cell diagnosis products

**1.5 SIGNIFICANCE OF STUDY**

With the growth in information technology, the study offers numerous examples in sickle cell anemia diagnosis. Doctors do not need to carry a lot of papers in order to check a particular situation but the use of sickle cell diagnosis program to do so. Time wasted in attending to patients is reduced to the bare minimum as the software help to facilitate work. Individuals on their own can also buy the software in order to master their body system about their genotype.

**1.6 SCOPE OF STUDY**

This project work is narrowed to both the internal and external blood organs in human body. The project based more on the pictorial representation of the organs and their functions.

**1.7 LIMITATION OF STUDY**

Owing to the scope of this project work as stated above, this project work is limited to General Hospital Wukari.

It is important to mention here that time was a major constraint in the course of fact finding. It is also wise to mention here that some information we need to work with were not supplied because of the unwillingness of the doctors in reviewing some vital information needed for this project work.

**1.8 PROJECT ORGANIZATION**

This report is organized into five chapters. The first chapter takes care of introduction: background of study, statement of the problem, aims and objectives of study, significance of study, scope of the project, limitation of study and definition of terms. Chapter two surveys the literature review of this work. In chapter three, System Analysis, methodology and design: Analysis of the existing system, limitation of existing system, justification of the new system, methodology, Data collection, Data analysis, architecture of the system, top down design and software, and system flowchart.

In chapter four, system implementation, testing and integration: choice of development tools, system requirements, and testing were carefully done. Finally chapter five closes up with summary, recommendations and conclusion.

**1.8 DEFINITION OF TERMS**

**SICKLE CELL**: A kind of disease that affects the red blood cell which is inherited from ones parent when they have sickle cell traits (AS)

**Sickle cell anemia (SS):** An inherited disorder of the red blood cells in which the hemoglobin is different from the normal hemoglobin.

**Hemoglobin**: Chemical substance (an iron containing protein) of the red blood cell, which carries oxygen to the tissues, and gives the cell its red color.

**PATIENT**: One who is sick and needs treatment or a person been diagnosed.

**DIAGNOSIS**: The identification of the nature and cause of illness.

**DISEASE**: An abnormal condition of the body or mind that causes dysfunction in human body system; destruct from injury insofar as the latter is usually instantaneously acquired.

**HOSPITAL**: A health facility where patients receive treatment.

**MANAGEMENT:** This is the process of getting activities complete efficiently and effectively with and through other people.

**SYSTEM**: Is a group of interdependent items that interact regularly to perform a task.

**COMPUTER**: Is an electronic device that can accept data inform of input, process the data and have the ability to store the data and retrieve it for future use.

**HARDWARE**: This is the physical component of computer system that can be seen, touch or feel.

**STORAGE**: Is the act of storing already processed data using a storage media.

**DATABASE**: Is the collection of related files.

**DOCTORS**: Are those that give medical aid to patients.

**NURSING**: Is a profession focused on assisting individuals, families and communities in attaining, maintaining and recovering optimal health and functioning-modern definition of nursing defined it as a science and an art that to curses n promoting quality of life as defined by persons and families, throughout their life experience from birth to care at the end of life.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.0 Introduction**

Sickle cell disease (SCD) is one of the most common genetic diseases worldwide and its highest prevalence occurs in Middle East, Mediterranean regions, Southeast Asia, and sub-Saharan Africa especially Nigeria [ 1, 2]. SCD is a chronic hemolytic disorder that is marked by tendency of hemoglobin molecules within red cells to polymerize and deform the red cell into a sickle (or crescent) shape resulting in characteristic vasoocclusive events and accelerated haemolysis. It is inherited in an autosomal recessive fashion either in the homozygous state or double heterozygous state. When inherited in the homozygous state, it is termed sickle cell anemia (SCA). Other known SCD genotypes include haemoglobin SC disease, sickle beta plus thalassaemia, and sickle beta zero thalassemia (which has similar severity with sickle cell anaemia), haemoglobin SD Punjab disease, haemoglobin SO Arab disease, and others. In Nigeria, SCD forms a small part of the clinical practice of most general duty doctors, as there is gross absence of dedicated sickle cell centres. Thus, it may be difficult to keep abreast of current knowledge and practices in the treatment of SCD. The purpose of this paper therefore is to provide a comprehensive and concise review of SCD and its management for physician education in Nigeria. Particular attention is given to its local

Epidemiology, clinical phenotypes and complications, current treatment guidelines, practice challenges, and recommendations for improved care. Relevant literatures and local references including clinical studies, reviews, and texts were gathered, summarized, and presented in this paper.

**2.1 Natural History/Natural Selection**

Historians believe that DNA mutations, which were responsible for the first

Versions of the sickle cell gene, originally arose in various African regions

1), including Cameroon, Central Africa Republic, Benin, and Senegal (Jones, 2008).

Studies show that the Trans-Atlantic slave trade introduced the sickle cell gene into the Americas and the Caribbean islands. African slaves, who carried the sickle cell trait, had the specific β-globin gene. Popmpa (1996) showed that carriers, who had the sickle cell trait, had a heterozygote advantage of being resistant to malarial infection. The Indo-European sickle mutation also originated in the Indus Valley Harappa. This particular mutation is found in Saudi Arabia, Oman, Bahrain, and Kuwait.

A British colonial medical officer, E. A. Beet, stationed in Zimbabwe in the

1940s, first observed that blood from malaria patients, who carried the sickle cell trait, had fewer malarial parasites compared to blood from patients without the trait (Bloom, 1995). However, in the 1950s, Anthony C. Allison developed his own hypothesis on the association of malaria and the sickle cell trait. By following up on Beet and a physician in Zaire during that time, Allison was able to hypothesize that the sickle cell trait offered protection against malaria. He believed that people with the sickle cell trait did not easily succumb to malaria as often as people without the trait (Bloom, 1995). Some evidence against Allison’s hypothesis shows no difference in the concentration of blood-borne malarial parasites that exist in people with the sickle cell trait compared those without it 10 (Bloom,1995). However, research shows that the sickle cell traits offer more protection against malaria to children than to adults, and adults are able to develop antibodies that can attack parasites in the immune system and increase their survival rate in malarial climates. Compared with adults, young children are not able to produce antibodies to the malaria disease until their immune system is more mature (Bloom, 1995).

**2.2 Epidemiology**

About 5–7% of the global population carries an abnormal hemoglobin gene [3, 4]. The most predominant form of haemoglobinopathy worldwide is sickle cell disease. The greatest burden of the disease lies in sub-Saharan Africa and Asia [ 5 ].The prevalence of sickle cell trait ranges between 10 and 45% in various parts of sub-Saharan Africa [ 6 –8 ]. In Nigeria, carrier prevalence is about 20 to30% [ 9 , 10 ]. SCD affects about 2 to 3% of the Nigerian population of more than 160 million [ 9]. Recent estimate from a large retrospective study by Nwogoh et al. in Benin City, South-South Nigeria revealed an SCD prevalence of 2.39% and a carrier rate of about 23% [ 11 ].

**2.3 Brief History and Genetic Origin of SCD**

In 1874, Dr. Horton, a Sierra Leonian medical Doctor, reportedly gave the first description of clinical symptoms and signs which is now referred to as sickle cell disease [ 12]. Herrick, a Chicago physician, also gave a formal description of the disease in 1910 when he observed abnormal sickle shaped red cells in the blood of a dental student from West Indies who had anemia [13]. In 1927, Hahn and Gillespie observed that sickling of red cells was associated with conditions of low oxygen tension. In 1949, Linus Pauling and colleagues demonstrated that haemoglobin in these patients was different from normal subjects using protein electrophoresis [ 14]. However, Venon Ingram and J. A. Hunt in 1956 sequenced the sickle haemoglobin molecule and showed that the abnormality was due to valine substitution for glutamate on the 6th position of the sickle beta-haemoglobin gene .Marotta and coworkers in 1977 showed that the corresponding change in codon 6 of the beta-globin gene was GAG to GTG [14]. Since then, further insights have been gained into understanding the origin, complex pathophysiology, and treatment of the disease through molecular biology techniques. Africa and Asia are considered as the birthplace of the sickle cell mutation. Sickle cell disease is believed to be a consequence of natural mutation of the beta-globin gene (HBB) affecting the gametes and transferred to subsequent generations. Using restriction fragment length polymorphism analysis, four main African haplotypes and one Asian haplotype of the beta-globin chain genes have been characterized and are believed to originate differently in these regions. The main African haplotypes include Senegal, Benin, Bantu (Central African Republic), and Cameroon haplotype [15– 18]. The Bantu haplotype is associated with the most severe disease phenotype while the Asian (also called Arab-Indian) haplotype is associated with a mild phenotype [19]. SCD is found in other parts of the world including USA and Europe due to migration and interracial marriages [ 5 , 20]. The high prevalence of SCD in sub-Saharan Africa has been attributed to survival advantage conferred by the sickle cell trait against Plasmodium falciparum. Resistance of individuals with sickle cell trait to Plasmodium falciparum creates a selective pressure that has maintained the sickle cell gene within human populations in malaria endemic regions like sub-Saharan Africa. This phenomenon is termed balanced polymorphism [21, 22].

**2.4 Aetiopathogenesis of Sickle Cell Disease**

SCD is a qualitative haemoglobinopathy resulting from a structural change in the sequence of amino acids on the beta globin chain of the haemoglobin molecule due to a point mutation. The sickling mutation causes a single base change from adenine to thymine on the 17th nucleotide of the beta globin chain gene (HBB). This invariably translates into substitution of valine for glutamate on the 6th amino acid of the beta globin chain. The abnormal biochemistry of this mutant haemoglobin induces polymerization of Hb S molecules within the red cells, so called sickling. On the sickle haemoglobin, the glutamate protein molecule, which is hydrophilic, polar, and negatively charged, is replaced by a less polar, hydrophobic, neutral amino acid, valine. Under deoxy conditions, the abnormal valine residue causes intraerythrocytic hydrophobic interaction of sickle haemoglobin tetramers, leading to their precipitation and polymer formation, so called gelation [23]. Eventually, all cytosolic haemoglobin molecules precipitate into seven (one inner and six outer) double strands with cross-links which are called tactoids. Upon reoxygenation, unsickling occurs and the red cell assumes its normal shape. However, repeated sickling and unsickling of the red cell damages the red cell membrane, due to herniation of sickle haemoglobin polymers through the cytoskeleton, thus rendering the red cell permanently sickled. These appear as irreversibly sickled cells (ISCs) on peripheral blood cytology. The kinetics of red cell sickling is highly heterogenous. Several variables are known to affect the rate and degree of sickling of the red cells.Intracellular dehydration of sickle red cells increases mean cell haemoglobin concentration (MCHC) [14]. Higher MCHC favours sickling. As such, very high Hb S level of about 80 to 90% seen in the homozygous disease is associated with a worse disease while the presence of alpha thalassemia (one or two gene deletions) ameliorates the disease. Another variable is the presence of other interacting nonsickle haemoglobin. Of note is fetal haemoglobin (Hb F). Higher proportion of Hb F is associated with mild disease. When present, high levels of Hb F are uniformly dispersed within the red cell and it retards the sickling process. Thus, coinheritance of sickle haemoglobin with hereditary persistence of fetal haemoglobin (HPFH) is associated with mild disease [24]. Similarly, this advantage is positively utilized through clinical use of fetal haemoglobin inducing drug such as hydroxyurea. Vascular beds that have intrinsically sluggish venous outflow such as bone marrow, spleen, or inflamed tissues are at higher risk of infarctive events due to prolonged microvascular transit time [25].

**CHAPTER THREE**

**3.0 SYSTEM ANALYSIS, METHODOLOGY AND DESIGN**

**3.1 ANALYSIS OF THE EXISTING SYSTEM**

The existing system is a system that is been carried out manually.

A system in which all the methods of administrating health to patients is of a manual approach. This approach is such that the doctors or radiologists concerned will be making use of the noted materials. Critical analysis of this system reveals that it is a system prone to a lot of errors and it is not effective. Because the doctor depends so much on his brain which sometime will result in incorrect assumption of drug as a result of his/her tiredness. Careful analysis also shows that because of the complexities of the manual system, doctors are forced to see but a few patients during work. Here and there, patients are seen to develop ungrateful attitude towards some doctors because of the manual system in existence.

Another problem of this manual method of attending to patients is enough energy dissipated by doctors.

**3.2 LIMITATIONS OF THE EXISTING SYSTEM**

A lot of problems are associated with existing system. The existing system involves the use of manual way to treat patients.

The system has proved defective as the objective of the system has also failed. Some of the limitations associated with the existing system include the following:

1. Trial and error method employ during treatment.
2. Much dissipation of energy on medical doctors.
3. Time wastage in treating many patients.
4. Wrong assumption of some internal problems during treatment.

Health of some patients are endangered

**3.3 JUSTIFICATION OF THE NEW SYSTEM**

With the introduction of the new system, a lot of positive changes have been noticed. The numerous problem associated with the manual system is minimized, if not totally put to an end.

Doctors will now do their work with assurance and the health of patients will no longer be endangered. They will now work with easy and joy with the help of the new system.

**3.4 METHODOLOGY**

This involves the specification of procedures for collecting and analyzing data necessary to define or solve the problem for which the research is embarked upon. The scope of this research covers the General hospital wukari in particular.

**3.4.1 Primary Source**

This involves oral interview conducted with various personnel in the General hospital wukari, review and sharing their experience about the difficulties they undergo in using file methods

**3.4.2 Secondary Source**

This includes the use of textbooks, dictionaries, journals, newspapers, electronic books and internet materials to collect data and aid comprehension of the system.

**3.5 DATA COLLECTION**

1. **PERSONAL INTERVIEW:** Some of the patients were interviewed to share their feeling and experience about the manual system of attending to them. Their respond was that manual system is highly cumbersome and boring. They stressed that the manual system has not helped them much.

Some of the victims of sickle cell disease were interviewed on how they feel and what are the symptoms of sickle cell anemia. Also some professional doctors were interviewed about sickle cell disease and its symptoms.

**2. OBSERVATION:** patients were clearly observed based on the information gathered about sickle cell disease and it symptoms.

3. **BROWSING METHOD:** Relevant information concerning computer based diagnosing information system on sickle cell anemia is gathered from the internet.

**3.6 INPUT DATABASE INTERFACE**

Updating data or any record into the system to be stored in the database after being processed requires an inputting interface.

First Name

Last Name

Phone Number

Country

State

Address

Status

Sex

Date of birth

E-mail

Password

**Figure 3.1 Input Database Interface**

**3.6.1 OUTPUT DATABASE INTERFACE**

This is an illustration of the output database interface

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Patient  Name | Phone  Number | Country | State | Address | Sex |  |
| Abubakar Sadik | 08165450022 | Nigeria | Taraba | Fuwukari | Male |  |
| Sunday Kadsu | 08165562576 | Nigeria | Nassarawa | Awe LGA | Male |  |
| Joy Luka | 07039097007 | Nigeria | Calaba | Calaba | Female |  |

**Figure 3.2 Output data interface**

**3.7 TOP-DOWN DESIGN AND SOFTWARE**

**3.7.1 The Main Menu Flowchart**

MENU

SERVICE

CONTACT

REGISTER

**Figure 3.3 the main menu flowchart**

**3.7.2 The Subsystem flow chart**

REGISTER

First Name

Last Name

Register

Phone Number

Country

State

Address

Status

Sex

Date of Birth

E-mail

Password

Confirm password

**Figure 3.4 the subsystem flowchart**

**3.7.3 Database Design**

This is the process of producing a detailed data model of database

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Data type** | **Null** | **Description** |
| Fname | Varchar(30) | No | firstname |
| lname | Varchar(30) | No | Lastname |
| phone | Varchar(30) | No | Phone number |
| Country | Varchar(30) | No | Country name |
| State | Varchar(32) | No | Name of state |
| Address | Varchar(100) | No | Address name |
| mstatus | Varchar(30) | No | Marital status |
| Sex | Varchar(30) | No | Sex |
| Dob | Varchar(32) | No | Date of birth |
| Email | Varchar(34) | No | Email |
| Password | Varchar(34) | No | Password |
| Comment | Text | No | Comment |
| Symptoms | Text | No | Symptoms |
| Medication | Text | No | Medication |
| ddate | Varchar(32) | No | Diagnose date |

**Figure 3.5 shows the database design**

**3.9 SYSTEM FLOWCHART**

This is a way of displaying how data flows in a system

DIAGNOSED RESULT

MENU

REGISTER

LOGIN

DIAGNOSE

USER

**Figure 3.6 System Flowchart**

**CHAPTER FOUR**

**4.0 SYSTEM IMPLEMENTATION, TESTING AND INTEGRATION**

**4.1 CHOICE OF PROGRAMMING LANGUAGE**

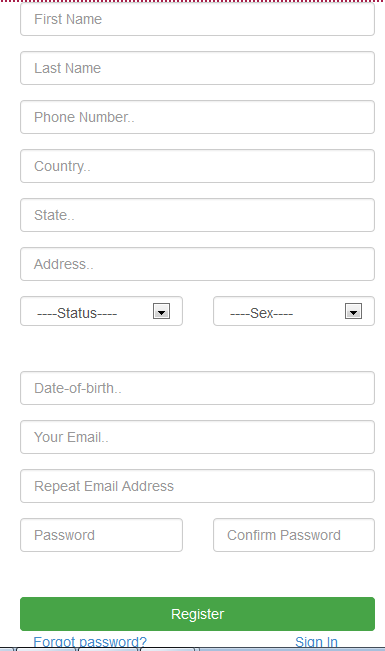
The new system is implemented using PHP programming language. This is because the programming language has the advantage of easy development. Flexibility and it has the ability of providing the developer/programmer with possible hints and it produces a graphical user interface.

**4.2 MAIN MENU IMPLEMENTATION**

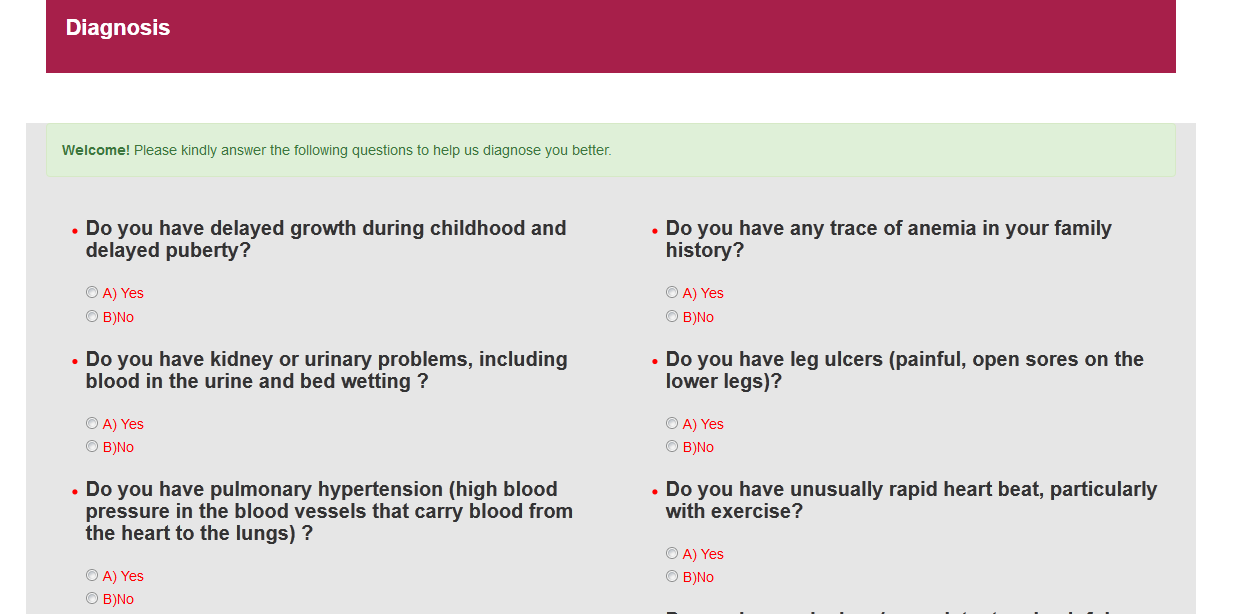
The new system is designed to be put into efficient use. Here, we will look into the various technical aspects that influenced the successful implementation of this system and determine the effective operation of the system. System implementation follows the approval of the system proposals and its objectives, thus it is to arrive at a satisfactory, implemented, completed, and function evaluated automated system. The patient register by filling the patient form provided, he then login with his e-mail and password, if the e-mail and password is correct he will gain access to diagnose form, from there he will then select some symptoms based on how he feels and then click on submit to diagnose and give out result.

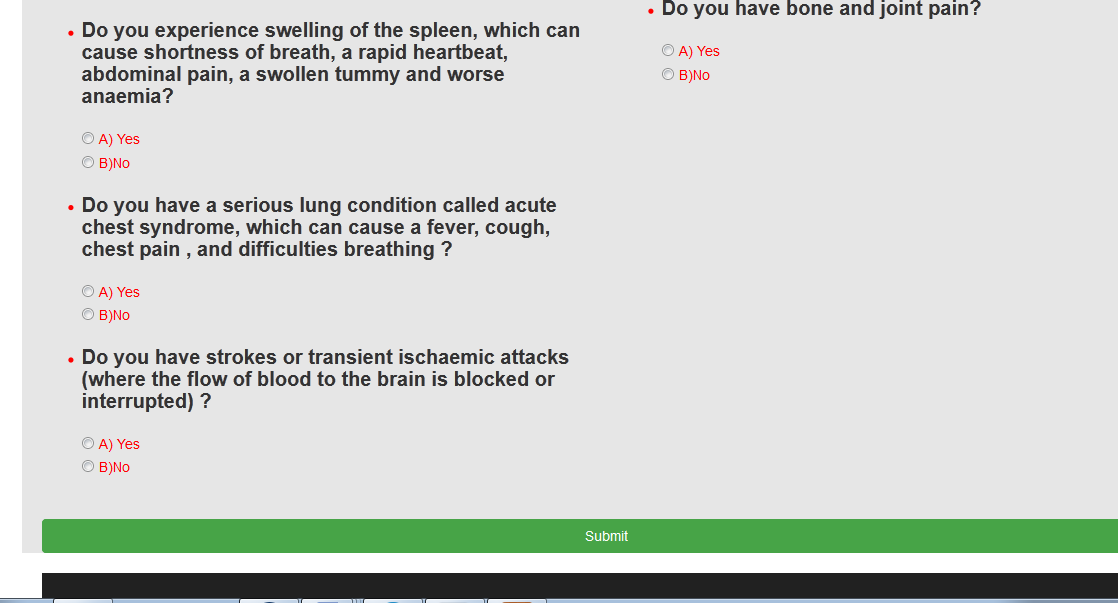
****

**Fig 4.1 Shows the Main Menu**

****

**Fig 4.2 patient registration interface**

****

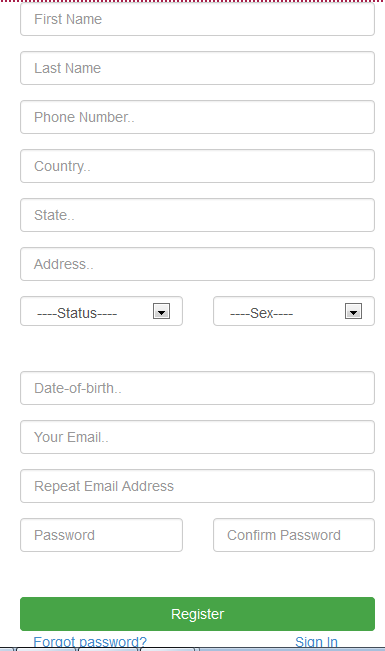
****

**Fig 4.3 Shows diagnose form**

**4.3 IMPLEMENTATION OF THE SUBSYSTEM DRIVERS**

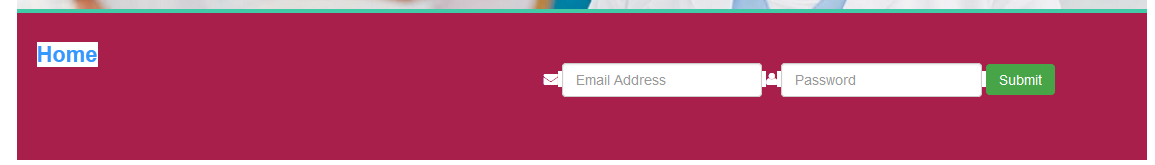
**4.3.1 Patients registration form**

This contains simple for patient information



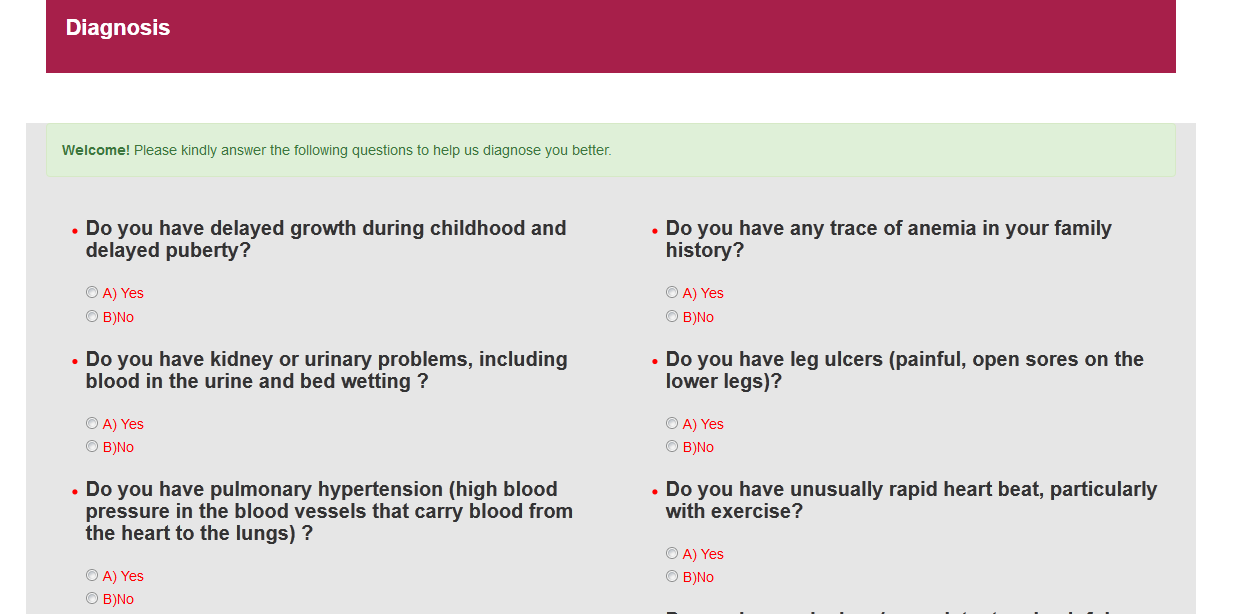
**Figure 4.4 patient registration form**

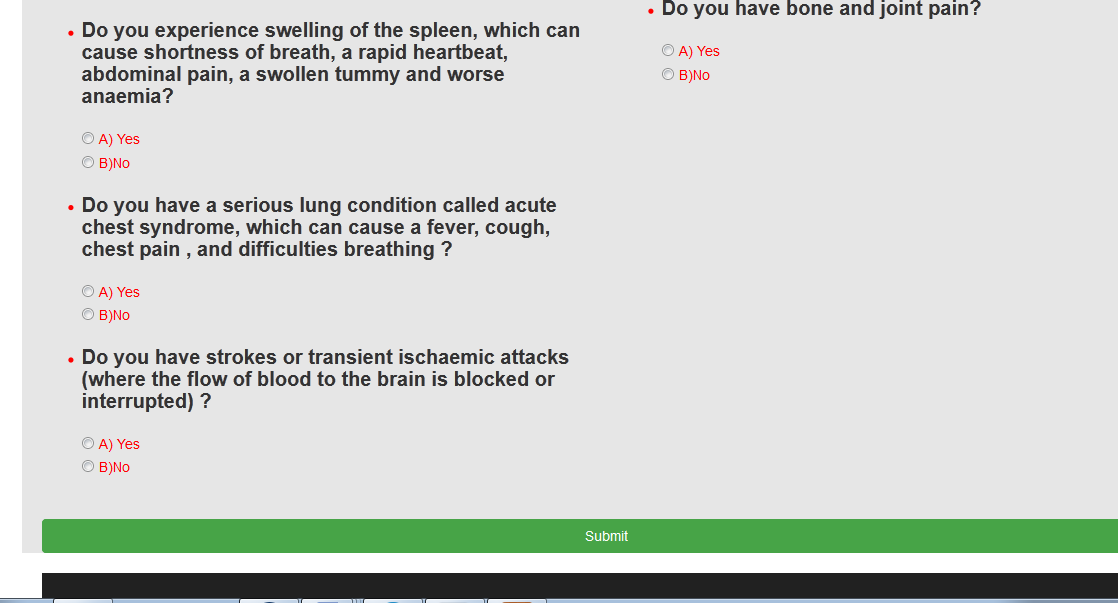
**4.3.2 Patient Login Interface**



**Figure 4.5 Provide an interface for patient login**

**4.3.3 Patient diagnose form**

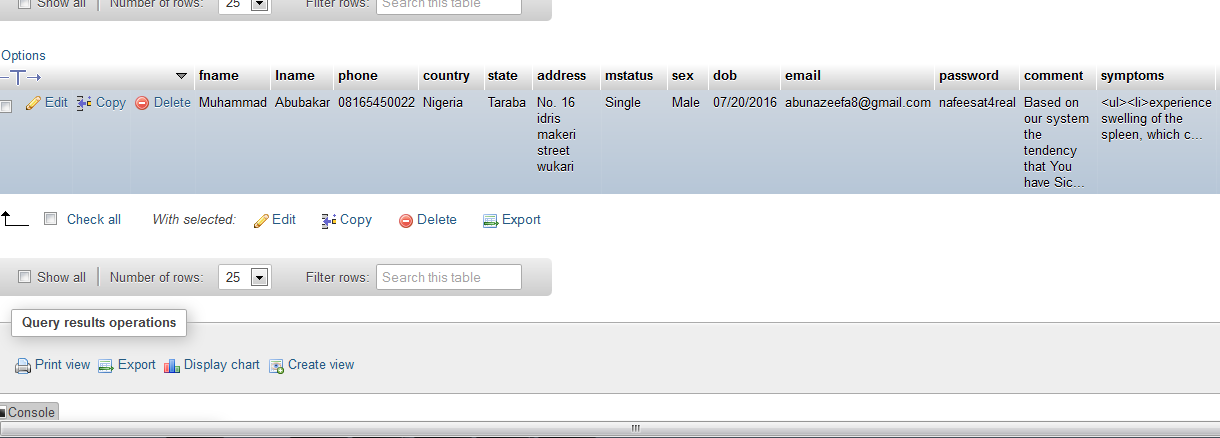
****

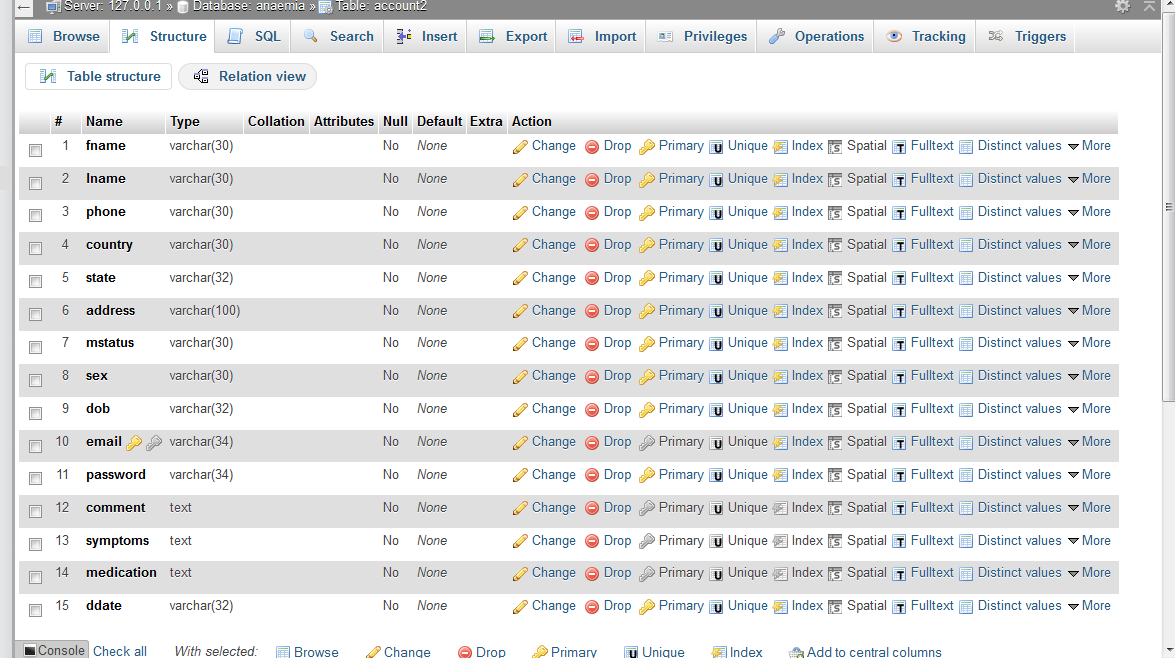
****

**Figure 4.6 provides checkbox for patient to tick symptoms.**

**4.4 DATABASE IMPLEMENTATION**

This shows how the database is being implemented.

****

****

**Figure 4.7 Database implementation**

**4.4 SYSTEM TESTING AND INTEGRATION**

The accuracy of the program was tested with some varying data. This gives the assurance that the new system will achieve its purpose and objectives.

After test-running with varied data, which is after running the program, the output was shown on the monitor. The output can also be printed on paper. This shows that the design of the new system was perfect and effective

**4.5 THE TEST PLAN**

The main purpose of testing is to ensure the diagnosis sickle cell anemia information system meets all its functional requirements.

**4.6 ACTUAL TEST VS EXPECTED TEST RESULT**

**4.6.1 Unit Testing**

**Table 4.1 Actual test vs expected test result**

|  |  |  |
| --- | --- | --- |
| **The Test Data** | **Expected Test Result** | **Actual Test Result** |
| Registration Form | Expected to see the registration form at the main menu immediately the software is run. | When click on Register, a form now appears where you supply your information |
| Login Form | Expected to see the login form immediately after registration | A form appears where you supply your e-mail and password |
| Diagnose form | Expected to enable patient make selection of symptoms | Allow user to select symptoms |
| Result | Expected to display result based on selected symptoms | Enable user to see diagnosis result based on symptoms selected |

**4.7 USER MANUAL**

i . Switch on the computer system.

ii. At the desktop, click start button.

iii. Select my computer

iv. From the CD ROM, Select the sickle cell diagnosis’ software to load it

v. At the home, click on Register and input your information

vi. After successful registration, then login with your e-mail and password to access the diagnose module

vii. select symptoms and click on diagnose to view your result

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND RECOMMENDATION**

**5.0 INTRODUCTION**

**5.1 SUMMARY**

The information contained in the medical record allows health care providers to provide continuity of care to individual patients. The medical record also serves as a basis for planning patient care, documenting communication between the health care provider and any other health professional contributing to the patient’s care, assisting in protecting the legal interest of the patient and the health care providers responsible for the patient's care, and documenting the care and services provided to the patient. In addition, the medical record may serve as a document to [educate](http://en.wikipedia.org/wiki/Education) medical students/[resident](http://en.wikipedia.org/wiki/Medical_residency) physicians, to provide data for internal hospital [auditing](http://en.wikipedia.org/wiki/Clinical_audit) and [quality assurance](http://en.wikipedia.org/wiki/Quality_control), and to provide data for medical research. [Personal health records](http://en.wikipedia.org/wiki/Personal_health_record) combine many of the above features with portability, thus allowing a patient to share medical records across providers and health care systems.

**5.2 AREA OF APPLICATION**

The software has a very wide area of application in the medical field which includes: medical laboratory, hospitals and clinics etc.

**5.3 MAJOR CONTRIBUTION TO KNOWLEDG**

The major contribution to knowledge is the development of computer based information system that diagnoses sickle cell anemia.

**5.4 RECOMMENDATION**

From the researches and analysis carried out on this project work, Design and implementation of computerized aided medical diagnosis system on sickle cell anemia disease, it is recommended that the system should be used in General hospital Wukari to assist medical experts in carrying out their jobs. Also with the assistance of this software, other personnel can go through the software.

It is also recommended that more researches should be carried out by both students and medical practitioner alike to develop a more perfect and suitable imaging software system. The parallel running method should be used in changing the system.

**5.5 CONCLUSION**

Based on the findings of this work, the following conclusion has been reached. The implementation of computer based diagnosis information system on sickle cell disease will be a big relief for medical doctors and nurses.

The system can be of tremendous help in the following ways:

1. It will eliminate the trials and errors method of treatment which has swept over the medical profession.
2. It will also serve as a tool for quick operational decision making to medical doctors, thus enabling them to reach the solution to their patients problem more quickly and more accurately than when human brain which is un-aided is used.
3. It will effectively take over the chores which tend to keep the medical doctors and nurses away from their practice.

The above mentioned advantage could enable the hospital management to build a reliable establishment which offers express services to the patients. This will improve professional image and further restore public confidence for the Medicare

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**PROGRAM APPENDIX**

INDEX

<?php

include('dbcon.php');

if(isset($\_POST['log'])){

$email = $\_POST['email'];

$password = $\_POST['password'];

$query = "SELECT \* FROM account2 WHERE email='$email' and password ='$password' ";

$result = mysql\_query($query);

$count = mysql\_num\_rows($result);

if($count !==0){

session\_start();

$\_SESSION['email'] = $email;

mysql\_close($con);

header('location:index.php');

}

else{

?>

<script>

alert("invalid email/password");

</script>

<?php }

}

?>

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="utf-8">

<title>Park City Multi-purpose Free Bootstrap Responsive Template</title>

<meta name="viewport" content="width=device-width, initial-scale=1.0" />

<meta name="description" content="" />

<meta name="author" content="http://webthemez.com" />

<!-- css -->

<link href="css/bootstrap.min.css" rel="stylesheet" />

<link href="css/fancybox/jquery.fancybox.css" rel="stylesheet">

<link href="css/jcarousel.css" rel="stylesheet" />

<link href="css/flexslider.css" rel="stylesheet" />

<link href="js/owl-carousel/owl.carousel.css" rel="stylesheet">

<link href="css/style.css" rel="stylesheet" />

<!-- HTML5 shim, for IE6-8 support of HTML5 elements -->

<!--[if lt IE 9]>

<script src="http://html5shim.googlecode.com/svn/trunk/html5.js"></script>

<![endif]-->

</head>

<body>

<div id="wrapper">

<!-- start header -->

<header>

<div class="navbar navbar-default navbar-static-top">

<div class="container">

<div class="navbar-header">

<button type="button" class="navbar-toggle" data-toggle="collapse" data-target=".navbar-collapse">

<span class="icon-bar"></span>

<span class="icon-bar"></span>

<span class="icon-bar"></span>

</button>

<a class="navbar-brand" href="index.php"><img src="img/logo.png" alt="logo"/></a>

</div>

<div class="navbar-collapse collapse ">

<ul class="nav navbar-nav">

<?php

session\_start();

$users = "";

$logged = "";

// Accessing session data

if(isset($\_SESSION["email"]) ){

$users = $\_SESSION["email"];

$logged = "You are logged-In already ";

?>

<li class="active"><a href="index.php">Home</a></li>

<li ><a href="diagnosis.php">Diagnose</a></li>

<li><a href="previous.php">Previous Rrsult</a></li>

<li ><a href="services.php">Services</a></li>

<li><a href="contact.php">Contact</a></li>

<li><a href="logout.php">Log Out</a></li>

<?php }?>

<?php

if(!isset($\_SESSION["email"]) ){

?>