

Foot Care Sandal for Diabetic Patients Monitoring by using Lab View Software

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Abstract- In this paper, experiment is about effective screening of foot ulcer in diabetic patients is described. In Diabetic patients neurovascular complexities increased and pressure developed in foot regions. Diabetic patients loose pain and temperature sensation in their feet during standing and working, due to this injury may get develop in the feet. To prevent this foot ulcer detection is essential. So here in this paper author describes the developed circuit to measure the pressure on the foot with the help of flexi force sensor.

Key words:- Lab view software, Flexi force sensor, Arduino, diabetic foot pain and ulcer

I. INTRODUCTION

The diabetic patients with foot ulcers require long-term hospitalization and carry the risk of limb amputation. Foot complications are common in diabetic patients and are considered one of the most expensive diabetes complications to treat. People at greatest risk of ulceration can easily be identified by careful clinical examination of the feet during provision of health education about diabetes complication and during follow-up visits. In developing countries, foot ulcers are one of the most feared and common complications of diabetes. They are a major cause of disability, morbidity, and mortality among diabetic patients, and it has been estimated that 15% of all people with diabetes will have an ulcer at some stage of their life. It is very essential to predict foot ulcer in earlier stage thereby further ulceration is prevented.

Feet provide stability support while walking, standing and running. The foot has five major functions, it is the foundation for the whole body, it can adapt to uneven ground, it acts as a shock absorber, it provides leverage for propulsion, and it absorbs transverse leg rotation. Loss of anyone of these functions can be detrimental to the patient, and is often noticed in patients with diabetes [1]. More than 50 million people in the world have diabetes the prevalence of diabetes among those over 45-65 years of age group. In India diabetic is the second most common cause of lower limb amputation. Foot ulceration is affecting 25% of patients with diabetes during lifetime and 85% proceeds to lower limb amputation [2]. Diabetes mellitus, commonly referred to

as diabetes was first identified as a disease associated with "sweet urine," and excessive muscle loss. Elevated levels of blood glucose (hyperglycemia) lead to spillage of glucose into the urine, hence the term referred as sweet urine. Normally, blood glucose levels are highly controlled by insulin, a hormone produced by the pancreas. Insulin regulates the blood glucose level. In patients with diabetes, the absence or insufficient production of insulin.

Diabetic foot pain and ulcer

Diabetic foot pain are common and foot ulcers are indication of poorly controlled diabetes, result of breaking of skin tissues and exposing the layer underneath. They are common under big toe sand ball of your feet.



Fig. 1. Diabetic foot

Software

Lab VIEW [6] software is ideal for any measurement or control system, and the heart of the NI design platform. The DAQ assistant is used to acquire the real time AC or DC voltage. The foot sensors are connected to the DAQ assistant and the corresponding DC voltage signals are acquired.

Foot chart

Lab VIEW was used to create a foot chart with colour box indicators to represent the placement of sensors on the subject's foot and to show colour changes for varied foot resistances. Readings from three different regions of the foot viz., foot-plantar, toe and the ball regions were taken using the copper electrodes for the subjects. It was observed that colour variations were found among subjects with dry and wet skin.

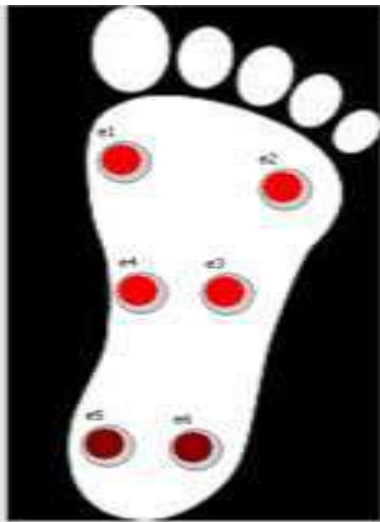


Fig. 2 Foot chart

All people with diabetes can develop foot pain and foot ulcers but proper foot care can prevent them. Treatment on diabetic foot ulcer depend on their causes.

Symptoms and diagnosis

First sign of foot ulcer is drainage from your foot stain your socks, unusual swelling, irritation, redness.

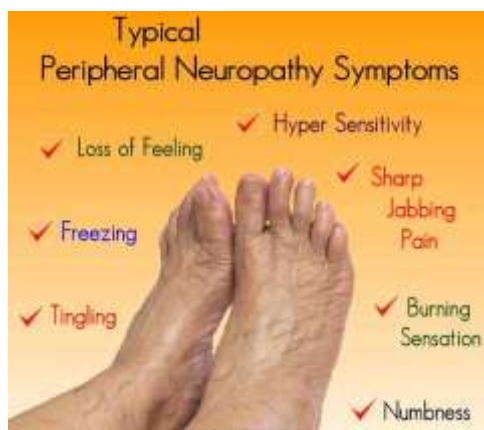


Fig. 3 Symptoms

The most common and visible sign of serious foot ulcer is black tissue. It happens because of absence of healthy blood flow to the area around ulcer and it becomes partial or complete gangrene.

Treating diabetic foot ulcer

Diabetic foot should be checked at every visit to the clinic. It is important to make a careful examination and assessment of the feet before making any decision about treatment. The examination is performed for 3 sections by podiatrists.

- Classification
- Staging
- Taking control

Risk factor for foot ulcers

People with diabetes are at risk for foot ulcers. There are some causes and some factors can increase risk of foot ulcer

Poor quality shoes

Poor hygiene

Improper trimming of toe nails

Heart disease

Kidney disease

Treating diabetic foot ulcer

Doctors recommend wearing certain items to protect your feet

Diabetic shoes

Foot braces

Foot bath

Enzyme treatment

Causes of diabetic foot ulcer

Most common Causes are as given below,

Poor circulation of blood

High blood sugar,

Nerve damage

Irritated or wounded foot

Poor circulation of blood is sign of vascular disease in which blood does not flow to your feet properly.

High blood sugar can slow down healing process of infectious foot ulcer. So blood sugar management is critical.

Nerve damage is a long term effect and lead to a loss of feeling in your feet first. Damage nerve feel highly painful. It reduces your sensitivity.

LITERATURE SURVEY

Various techniques are used for measuring pressure on diabetic foot. The traditional orthotic insole by taking impression is not sufficient to correct problems misalignments and stability. Planter foot pressure studies in patients with diabetic foot indicate relationship between excessive pressure and ulceration.

Sudoscan A non-invasive and quick method pressure detection Normal peak pressure and pressure contact ratio are basic element to prevent complication. The total pressure experienced by the foot during forefoot contact is maximum since for a very short period of time. The current method to prevent diabetic foot ulcer is doctor prescribed shoes and orthotic inserts to reduce the risk of ulceration by decreasing high planter pressure.

The new SUDOSCAN™ device is designed to perform a precise evaluation of sweat gland function based on sweat chloride concentrations using reverse iontophoresis and chronoamperometry. Measurements are performed where sweat glands are most numerous on the palms of the hands, soles of the feet and forehead. Large area nickel electrodes are used alternatively as an anode or a cathode and a direct current (DC) incremental voltage 4 volts is applied on the anode. This DC iontophoresis induces a voltage on the cathode and generates a current. The intensity of about 0.2 mA are obtained between the anode and the cathode, related to chloride concentration. The electrochemical phenomena are measured by two active electrodes (the anode and the cathode) successively in the three regions, while the four other passive electrodes allow retrieval of the body potential.

Walking foot pressures are found to be affected by the weight of the person and their walking velocity. It is also found that both the magnitude and duration of the dynamic foot pressures are important in the formation of ulcer in neuropathic feet of diabetic patients. Therefore, foot pressure measurements are made on a long optical pedobarograph which could accommodate at least two steps. The foot pressure analysis is done using two new parameters: Normalized Peak Pressure, NPP and Pressure Contact Ratio, PCR, which take into consideration the weight of the person. Walking velocity and magnitude and duration of the peak foot pressure acting in ten areas of the foot.

Tracking patients with a WEMR is a tool that could potentially increase patient safety and quality of cure allowing clinicians to more easily identify non healing wound. Bio impedance is a complex measurement comprising real and imaginary components.

PROPOSED SYSTEM

In this method, the pressure is measured by sensor and the particular patient's weight can be studied and set the maximum value for buzzer which indicate pressure which is developed on feet is maximum patient need treatment.

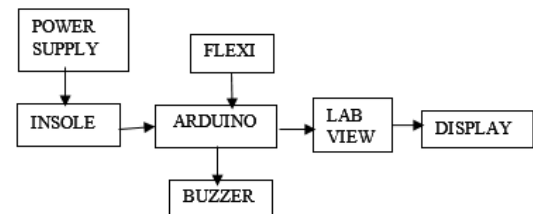


Fig. 4 Block diagram of the system

From above survey different techniques to monitor diabetic foot ulcer, here updated system is proposed to detect exactly infected area on the foot and where the chances of developing ulcer tissues. A platform is developed where FSR sensor is used. It is more accurate and sensitive and give a proper result. Detect ulcer infected foot in early stage of diabetes.

The main aim to develop this platform is that it gives an indication in early stage. Labview software can be used to measure a pressure and lab view is very easy to understand and user friendly also it is cost effective.

CONCLUSION

In this paper different technologies are used to detect the diabetic foot ulcer. Various sensors are used to detect chronic diabetic ulcers. Among these sensors flexi force sensors can be used easily and proper arrangement can be made according to pathogenesis and management, then it became cost effective and simple.

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