IoT Based Rapid V- Tester Analysis

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Abstract

The current pandemic emerged the doctors in India to test the different vitamin levels of the people going for treatment. Presently the doctors are advising the patient for vitamin tests. The presently available device for the vitamin tests enable to test only one vitamin at a time. The other vitamin needs to be tested individually. Hence it made an urge of testing other vitamins also. This urge made a demand of a device to test all the vitamins simultaneously. The devicethat we are planning to introduce will meet this demand. In the rapid development of technology, with the development of innovations, the field specialists are always searching for innovative electronic devices for easier notification of anomalies within the field. IoT-based technologies empower the possibility of evolving new and noninvasive care systems.

Keywords: Vitamin Tester, Sensor, Levels of vitamin

I Introduction

Health is an essential input for the development of human resources and welfare, further the quality of life improves and in turn enhances the social and economic development of the nation. But today's generations are busy in earning money and they are lack in caring their health. In the midst of all technological development in the medical field, the innovations are required for maintaining the health for better effective span of life. This pandemic seasonemerged the testing of different vitamins as essential part to maintain healthy and quality of life even after the different medication during the course of treatments [1]. Hence, we have planned to find a solution to test the vitamin levels at the earliest and provide them with a food chart which includes foods to be taken to maintain vitamin levels [2]. Since the healthier life is the main factor to everyone in this life, we decided to develop an appropriate device to save the people from various harmful diseases and to maintain a healthy life. So it is required to develop a vitamin tester at affordable cost so that anyone can buy a product and keep it with themselves [3][4].

As per the latest study made in India, it is found that the vitamin tests are not common in the medical field. It is very rarely used (as per the study made). The present one is vitamin D test which is normally advised by many of the doctors [5] [6]. Very rarely doctors advise them to testother vitamins (Eg: B12).

II Objectives

Rapid V- Tester is a sensor-based system (by using electrode) that is proposed toanalyze the vitamin levels of people in human body (B, D, E and K), by analyzing biological fluid samples (Blood). The electro chemical sensor is the excellent tool for classifying vitamins in different matrices. It senses the blood sample and finds the levels of the vitamin whether it is deficient, normal or excess (It depends upon the diagnosis of the individual

doctors also). The main advantages of this sensor are simply operative, smaller, portable, cost-effective device which can be used in home itself, so that they can often check and monitor their vitamin level to maintain their food equilibrium.

The Vitamin deficiencies are not taken in to consideration by people and such deficiencies are not usually determined at earlier stage. Even though, our government has taken several precautionary steps, it is vital to maintain the vitamin level for each category to save theirlife from these harmful diseases.

III Methods

This device works on the basis of electrochemical signals, using electrodes with external power supply. When a blood sample is collected using syringe and then converted as appropriate for the test. The Glass Carbon Electrodes and Au/Pan/γ-Al2O3 are respectively inserted into the micro-test tubes and electrochemical signals are detected. Then this signal are amplified and filtered and then provided as an input to the micro-processor Arduino UNO and obtained voltageis

used to find the concentration of vitamins (Vitamin K1, Vitamin D3, and Vitamin B12 & Vitamin E). Detected concentration can be viewed using the display.
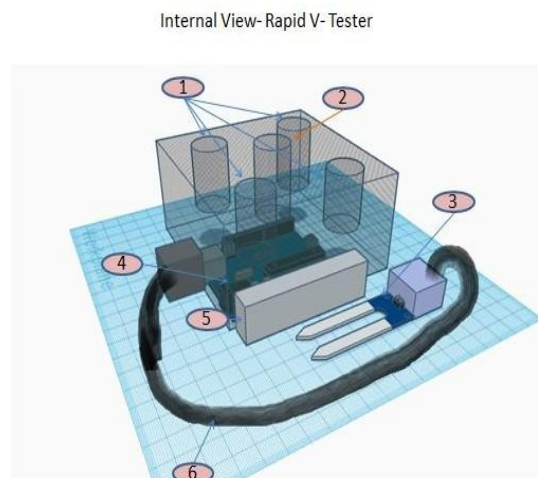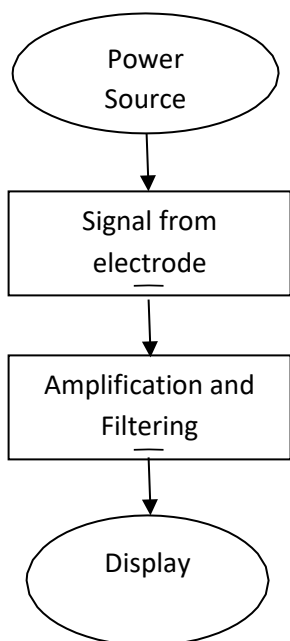
Internal View- Rapid V- Tester

Fig 2. Internal View – Rapid V-Tester
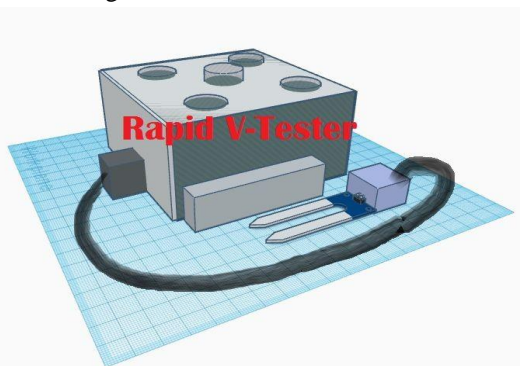
Fig 1. Working of Vitamin Test Device

Fig 3. Rapid V-Tester Table1.

Electro-Chemical Method-Measurement Techniques

Vitamin	Electrode	Technique	Electrolyte	pH	Linear range	LOD
VB$_{12}$	GCE/PTH	CV	PBS	6.5	0.01–100 µmol L^{-1}	2 nmol L^{-1}
VD$_3$	GCE	DPV	LiClO4 in 50% ethanol	NR	2.4–350 µmol L^{-1}	0.8 µmol L^{-1}
VE	Au/Pan/γ-Al2O3	DPV	LiClO4 in anhydrous	NR	NR	0.06 µmol L^{-1}
VK1	GCE	SWAdSV	HCl	NR	0.01–1 µmol L^{-1} and 5–100 µmol L^{-1}	8.9 nmol L^{-1} and 51 nmol L^{-1}

Results

As per the current biological analysis available, the Fat-Soluble Vitamins Profile is a great tool to gain an overall perspective of a patient's health, nutrient processing, and dietary insufficiencies. It plays integral roles in a multitude of physiological processes such as vision, bone health, immune function, and coagulation. Vitamins A, D, E, and K are members of Fat- soluble vitamin category. Night blindness, exophthalmia, increased oxidative stress, and many other diseases are caused due to deficiency of these vitamins.

The concentrations of fat-soluble vitamins are determined using a variety of techniques. Among the many techniques of determination, electrochemical sensor has garnered widespread interest because of their potential to improve performance. Additionally, the introduction of innovative materials has added a lot of benefits to sensing and will benefit the community.

It composes bio receptor, transducer, and the detector. It also allows sensing the vitamins, and depending upon the type of output signal from transducer, the different types of sensors exist. Here, the focus is on electrochemical sensors.

By using the electrochemical sensors it is found that, we can test the vitamin B, D, E and K simultaneously by using a sample blood. It is cost effective, time saving and speedy accuracy in result.

i. To analyze the current devices for testing different vitamins
ii. To develop a device to test the different vitamins simultaneously
iii. To design a device which is cost effective and user friendly

Discussion

As per the market survey done among the doctors, clinical labs, testing labs, Drug dealersand

Pharmacist, it is found that there is no device available to test more than one vitamin simultaneously. They need to take the vitamin individually. This situation made a huge demand as the doctors and medical practitioners expect the patients to do the vitamin level test for right diagnosis particularly during this pandemic period.

Moreover the patients expect the vitamin test in a single visit and simultaneously for all the vitamins without spending much money and time.

Hence the demand for a device which will yield the entire vitamins test in a single test device emerged as a huge market. It has got a high potential market in future in medical field.

As per the expectation of the clients demand this products needs to be offered in the healthcare market cost effective and user friendly.

Conclusion

This technology provides better results in terms of accuracy. In the current Covid scenario it helps to access the condition of a human body and enable the doctors and those who are examine can diagnose accurately, so that right treatment may be given to them. It is very simple, userfriendly and yield maximum accuracy.

The Vitamin deficiencies are not taken in to consideration by people and such deficiencies are not usually determined at earlier stage. Even though, our government has taken several precautionary steps, it is vital to maintain the vitamin level for each category to save their life from these harmful diseases.

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