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Ovulation Detection Mechanism-A Microcomputer Based Approach

[1]O.K. Ogidan, [2]A.J. Bamisaye and [3]O. Adetan
[1]Information Communications Unit,
Ondo State University of Science and Technology (OSUSTECH), Okitipupa, Nigeria
[2]Department of Electrical and Electronics Engineering,
Federal University of Technology, Akure, Nigeria
[3]Department of Electrical and Electronics Engineering, University of Ado Ekiti, Ado-Ekiti, Ekiti, Nigeria

Abstract: This study presents a real-time microcomputer-based logger for measuring Basal Body Temperature (BBT). BBT is the normal resting body temperature of a healthy person immediately upon waking in the morning. The temperature for women normally rises after ovulation due to hormonal changes. The temperature is logged real-time into the computer over a period and the BBT chart produced is used to predict ovulation. There is high correlation between the approach developed by this study and other standard measuring equipments-correlation of 0.9945 with standard thermistor and correlation of 0.9977 with standard thermocouple. This development enables privacy of use allowing women to predict their ovulation status at a personal level.

Key words: Basal Body Temperature (BBT), microcomputer-based logger, ovulation, thermistor, thermocouple and correlation, Nigeria

INTRODUCTION

Infertility is the inability of a couple to obtain a clinical recognizable pregnancy after 12 months of unprotected intercourse. The alarming rate of infertility among couples calls for serious efforts and attention from any woman who is serious about getting pregnant. Most women and sometimes their partners would want to learn when ovulation and implantation occurs and what is the best time for intercourse to achieve pregnancy.

Timing the ovulation period is a very important step towards getting pregnant. With the latest scientific improvements, several methods and tests are available for determining with a high degree of certainty when your ovulation occurs. These include (FWHC, 2004):

Calendar charting/ovulation calculator: Using this method, a woman uses her past menstrual cycle as a guide. This is done by calculating the average number of days in her cycle to estimate the future fertile times.

Cervical mucus monitoring: In this method, the cervical fluid is monitored each day. At the beginning of ovulation, the cervical fluid will go from dry or sticky to creamy like a lotion and finally will become like egg white. Many women compare mucus at this stage to raw egg whites. A woman is most fertile during the egg white phase.

Cervical observation: The position of a woman's cervix is used to determine ovulation. During and in the 1st few days after menstruation, the cervix is fairly low and firm like the tip of a nose. When the wet cervical fluid begins to show the cervix begins to move up becomes more soft, wet and open. During ovulation, the cervix is at its highest and most open. After ovulation, the cervix returns to its low, firm and closed position.

Lower abdominal discomfort: About one-fifth of women actually feel ovulatory activity which can range from mild achiness to twinges of pain. The condition called mittelschmerz may last a few minutes to a few hours (Ross and Pawlina, 2006).

Basal Body Temperature (BBT): The basal body temperature graph is probably the most widely used aid in the identification of the day of ovulation (Moghissi, 1976; Weschler, 2002). Following ovulation, a woman's temperature rises by 0.4-1.0 degrees and remains up till next menstruation period. This temperature-spike indicates ovulation has occurred. This is because releasing an egg stimulates the production of the hormone progesterone which raises the body temperature (WHO, 2004; Ogidan, 2006). The body might not feel this shift in temperature however with a more sensitive device. It could be easily detected. This study attempts to develop

Corresponding Author: O.K. Ogidan, Information Communications Unit,
Ondo State University of Science and Technology (OSUSTECH), Okitipupa, Nigeria

a user-friendly, microprocessor-based Basal Body Temperature (BBT) logger capable of detecting and recording the slightest shift in basal body temperature.

MATERIALS AND METHODS

Powered: This device contains a temperature sensor Negative Temperature Coefficient (NTC) thermistor which transduces the temperature into electronic analog signal. The analog signal is then passed into an Analog to Digital Converter (ADC). The converted signal is then received and transmitted (using a transceiver) to the microcomputer through the parallel port (Jan, 2000). In the laboratory setting, a personal computer is used. The arrangement is shown in Fig. 1. A computer program in Visual Basic 6.0 was then written to address the parallel port and to log the data into a user-friendly interface where the temperature is both interpreted and analyzed. Figure 2 shows the logger being assembled while Fig. 3 shows how the device is interfaced with a personal computer.

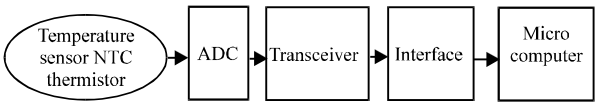

Fig. 1: Block diagram of a Basal Body Temperature (BBT) microcomputer logger

Fig. 2: A prototype Basal Body Temperature (BBT) logger

RESULTS AND DISCUSSION

The Basal Body Temperature (BBT) measured was logged into a user-friendly interface that facilitates the viewing, digital recording and graphical representation of the measured temperature as shown in Fig. 4, any change

Fig. 3: Diagram of a Basal Body Temperature (BBT) logger interfaced with a personal computer

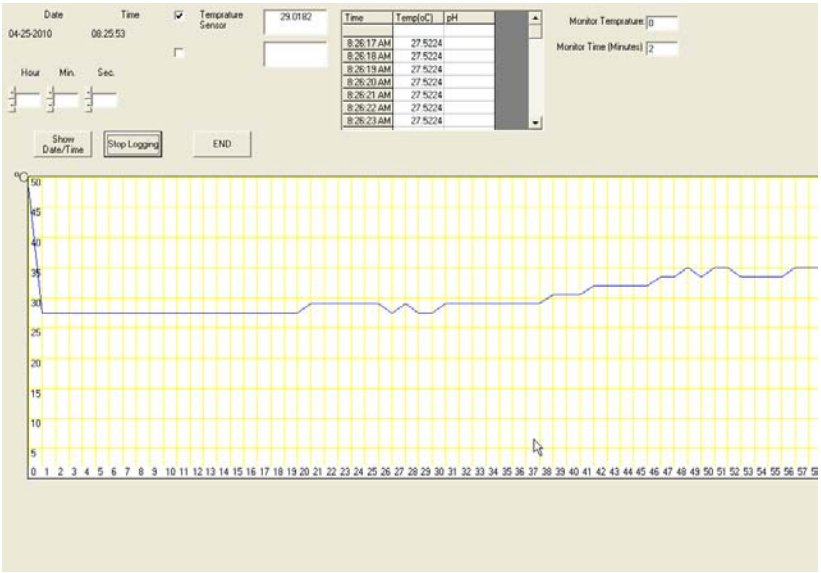

Fig. 4: User-friendly interface showing graphical representation of temperature measured by the logger

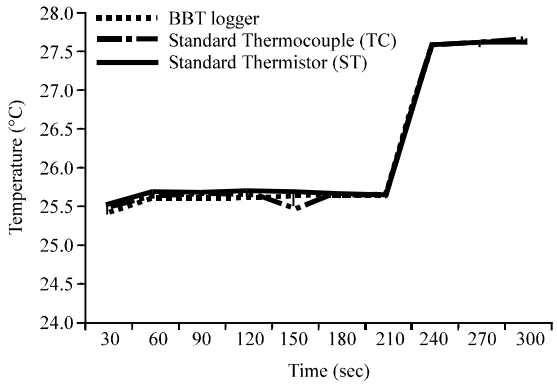

Fig. 5: Graph of developed BBT logger compared with standard thermistor and thermocouple when used to measure atmospheric temperature

(rise or low) in temperature for a specific period of time can easily be detected and analyzed. The developed logger was used (at room temperature) to measure atmospheric temperature alongside standard temperature sensors (thermistor and thermocouple) for about 1 h. The correlation with thermistor was 0.9945 and 0.9977 with thermocouple. The results tend to unity thus showing a high degree of measurement reliability. Figure 5 shows the graph of the comparison. A simple but sensitive temperature sensory device (called data-logger) was designed to measure Basal Body Temperature (BBT). The device is portable and battery.

CONCLUSION

This study has developed a Basal Body Temperature (BBT) logging system which makes fertility charting very easy. The system has been calibrated and is being put to clinical use.

The developed logger compares favourably with standard thermistor with a correlation of 0.9945 and with standard thermocouple with a correlation of 0.9977. This device has many advantages including enabling privacy provides non-intrusive method of ovulation detection provides data easily to physicians which could be interpreted for diagnosis and treatment of their patients and has a good potential for telemedicine.

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REFERENCES

FWHC, 2004. Feminist women's health center. http://www.fwhc.org/.

Jan, A., 2000. ParallelPort Complete. Lakeview Research Publishers, Madison, USA., pp: 10-30.

Moghissi, K.S., 1976. Accuracy of basal body temperature for fertility detection. Fertil. Steril., 27: 1415-1421.

Ogidan, O.K., 2006. Design and construction of real-time logging system. Master of Engineering Thesis, Department of Electrical and Electronic Engineering, The Federal University of Technology, Akure, Nigeria.

Ross, M.H. and W. Pawlina, 2006. Histology: A Text and Atlas. Williams and Wilkins, Lippincott.

WHO, 2004. Medical Eligibility Criteria for Contraceptive Use: Fertility Awareness-Based Methods. World Health Organization, Geneva.

Weschler, T., 2002. Taking Charge of Your Fertility. Harper Collins Publishers Ltd., New York.