

ASSESSMENT OF SERUM LEVELS OF DEHYDROEPIANDROSTERONE SULFATE (DHEAS) AND ESTRIOL (E3) IN THE 2ND AND 3RD TRIMESTERS OF PREGNANCY IN SOME PATIENTS ATTENDING ANTE-NATAL CLINIC IN SELECTED PRIVATE OBSTETRICS AND GYNECOLOGICAL SPECIALIST HOSPITALS IN PORT HARCOURT: A MEASURE OF FETAL WELL-BEING

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ABSTRACT

The serum levels of dehydroepiandrosterone sulfate (DHEAS) and Estriol (E3) was investigated in fifty (50) pregnant women in their second and third trimesters of pregnancy in some selected obstetrics and gynecological specialist hospitals in Port Harcourt, as a relevant measure of fetal well-being. As a routine, the consent of the women was obtained for the test to be performed both for medical and academic purpose. 4-5ml of blood was collected individually into a labeled lithium heparin bottle, and stored at 4°C for up to 24 hours and at -10°C for those samples to be analyzed at a later date. The investigation was carried out using enzyme-linked immunosorbent assay (ELISA) method with the use of an automated micro plate reader. The data obtained was compared with the standard reference values for DHEAS and E3. The result obtained showed a significant steady increase in dehydroepiandrosterone sulfate as well as that of Estriol when compared to reference values, as the trimester progresses. There was also an observed decrease in DHEAS and E3 as age of the patients increases. Slight increases in the levels of DHEAS and E3 are used to monitor the progress of the pregnancy and they also indicate fetal well-being.

Keywords: Dehydroepiandrosterone sulfate, Estriol, pregnancy, steroid hormones

No: of Figures :4

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INTRODUCTION

A steroid hormone is any of a group of hormones that belong to the class of chemical compounds known as steroids. They are secreted by three "steroid glands"- the adrenal cortex, testes and ovaries - and during pregnancy by the placenta (Holmes and Shalet, 1996). All steroid hormones are derived from cholesterol. They are transported through the bloodstream to the cells of various target organs where they carry out the regulation of a wide range of physiological functions. Steroid hormones are lipid molecules that act as hormones by causing chemical changes in other body cells.

Steroid hormones are vital to the smooth functioning of a number of physiological functions including various changes in a woman's body throughout pregnancy, such as successful implantation of fertilized egg to the uterine wall etc

Dehydroepiandrosterone (DHEA) is the most abundant circulating steroid in humans (William and Ganong, 2005), in which it is produced in the adrenal glands, the gonads and the brain (Schulman *et al.*, 2007). Dehydroepiandrosterone sulfate (DHEAS) is the sulfate ester of DHEA. In males, DHEAS assists in the development of male secondary sexual characteristics at puberty and can be metabolized into testosterone and androstenedione (Mo *et al.*, 2006). In women, it can be changed into estrogen. DHEAS level is useful as a marker of the function of the adrenal gland and to distinguish androgen-secreting conditions that are caused by

the adrenal glands from those that originate in the ovaries or testes (Rainey and Nakamura 2008).

Estriol is one of the three main estrogens produced by the human body. It is produced in significant amounts during pregnancy. It is made by the placenta from 16-OH-DHEAS. Estriol can be measured in maternal blood or urine and can be used as a marker of fetal health and wellbeing. If levels of "unconjugated estriol" are abnormally low in a pregnant woman, this may indicate chromosomal or congenital anomalies like Down syndrome. Estriol is included as part of the triple test and quadruple test for antenatal screening for fetal anomalies.

Pregnancy constitutes a special condition in women's life that affects various physiologic and endocrinology systems. Some of the hormones produced during pregnancy are present in much larger amounts than in the non-pregnant state. Other hormones are unique by presenting only during pregnancy. These endocrine changes that a pregnant woman undergoes are in the interest of pregnancy maintenance and mainly for the benefit of the fetus, whose metabolic needs vary greatly during gestation. During pregnancy, the production of steroid hormones greatly increases (Lantta *et al.*, 1997).

Pregnancy is a delicate period in a woman's life. Most women realize late that they are pregnant and as soon as they learn that they are pregnant and still in the first trimester, they hardly visit the hospital again until their second trimester. As soon

as the first trimester ends, a woman must have made up her mind to keep the baby and she does everything possible to protect the fetus. Estriol and DHEAS investigations are necessary tests that are used to monitor the wellbeing of the fetus. E3 and DHEAS levels are typically highest in women of childbearing age, and they increase during pregnancy. The levels of these hormones in pregnancy, age of pregnancy and age of the patients will be verified equally.

Materials and Methods

Collection of samples

Blood samples were collected from a total of fifty (50) healthy women in their second and third trimesters. The women were randomly selected from different private hospitals in Port Harcourt, Rivers State, Nigeria. The samples were centrifuged using ordinary 12 bucket centrifuge, and serum component collected and stored at 2-8°C for up to 24 hours, or frozen at -10°C or lower before the assay. No special pretreatment of sample was done.

Analysis

The serum samples were analyzed for DHEAS and Estriol levels using standard Enzyme Linked Immunosorbent Assay (ELISA) method with the aid of automated microtitre well reader.

Results/Discussions

Limited information regarding the impact of Estriol and DHEAS during pregnancy was the motive for the present study. Gestation is associated with profound

hormonal and metabolic alternations in the mother. These changes facilitate the placenta to take over the dominant role of steroid production. During pregnancy, on the average, Estriol concentration and DHEAS values increased steadily with the progress of pregnancy. For DHEAS, no subject showed a level below the lower limit of the normal range. This is consistent with similar works already documented (Chasalow, 1999). For subjects in their second trimesters of pregnancy, 50% had DHEAS levels within the normal range while 50% had levels above the normal range. 81% of the subjects in their third trimester of pregnancy had levels higher than the normal range while 19% had levels within the normal range of 0.46-2.75mg/ml. As the trimester progresses, DHEAS levels increase steadily. This fact is supported (Holtzclaw and Gordon 1999). The rise in the level of Estriol with a corresponding increase in the level of DHEAS corroborates the findings of Peretti *et al.*, (1998) and Wilson (1998) who observed that elevated levels of the two steroid hormones are indicative of fetal well-being.

Levels of Estriol in the blood can be used to determine whether a woman is pregnant or not, and to monitor the progress of the pregnancy. In the research done by Yang (1995), it was discovered that Estriol, which is produced in large amounts by the placenta, can be detected as early as the 9th week and its levels increase until delivery. This was found to be true and consistent with this research. Abnormal Estriol levels indicate that there is a problem with the developing fetus which could bear closer monitoring or additional

testing. In this research, all subjects had Estriol levels above the normal range of Estriol. Increase in Estriol levels during pregnancy has been evaluated by many researchers (Baird, 1996; Simpson and MacDonald 1991; Eugene and Gerald 1997).

When Estriol and DHEAS levels are checked in pregnant women, it enables those who may present abnormal levels to be helped in time, to avoid abortion or stillbirths. The increase in the levels of Estriol and DHEAS as observed in this study could be attributed to the proper biochemical functioning and the lifestyle of the subjects.

Many pathological conditions such as preeclampsia, anemia and impaired kidney function can create false positive and false negative results in E3 testing for fetal distress (Pagana and Pagana 2009); so it is advisable for women of reproductive age to maintain a healthy lifestyle and a healthy body weight.

In conclusion, the levels of DHEAS and Estriol was found to increase higher than their standard values and in relation to the progression of the pregnancy.

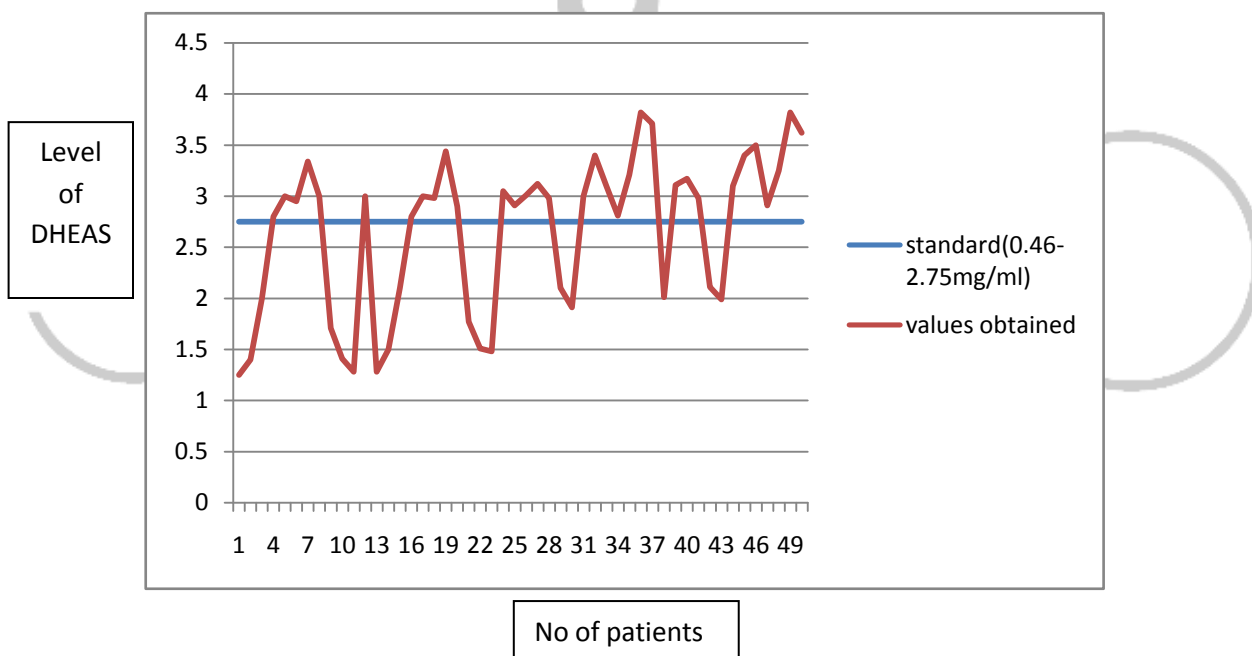


Figure 1 above is a graphical representation of the levels of DHEAS in all the patients compared with the normal level of DHEAS.

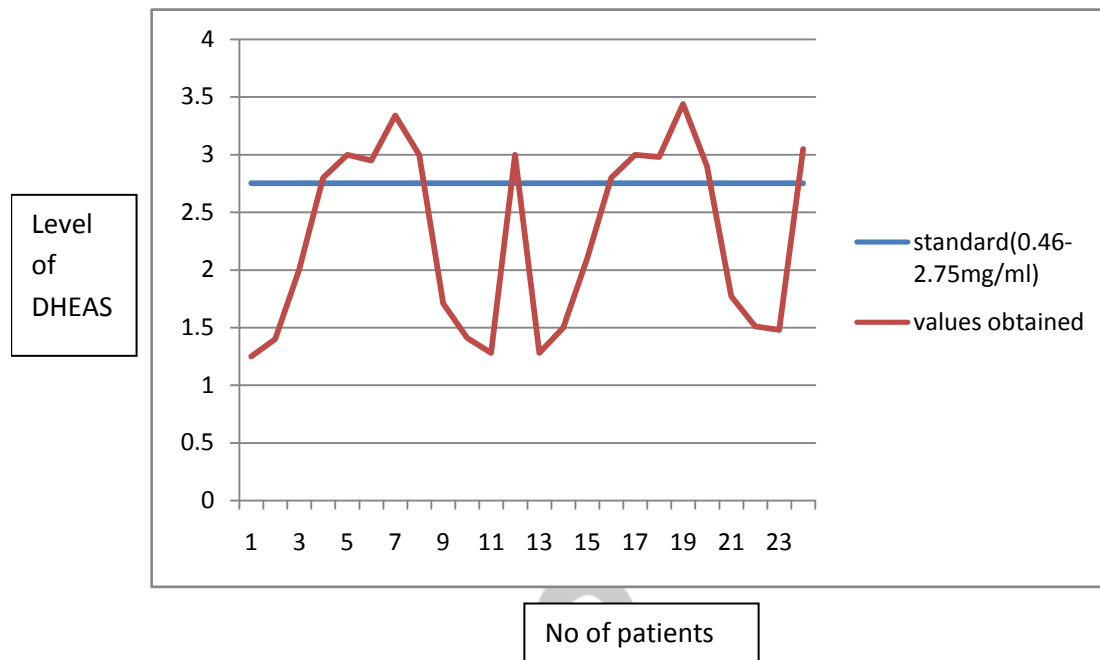


Figure 2 is a graphical representation of the levels of DHEAS in the patients in their second trimester of pregnancy, compared with the normal level of DHEAS.

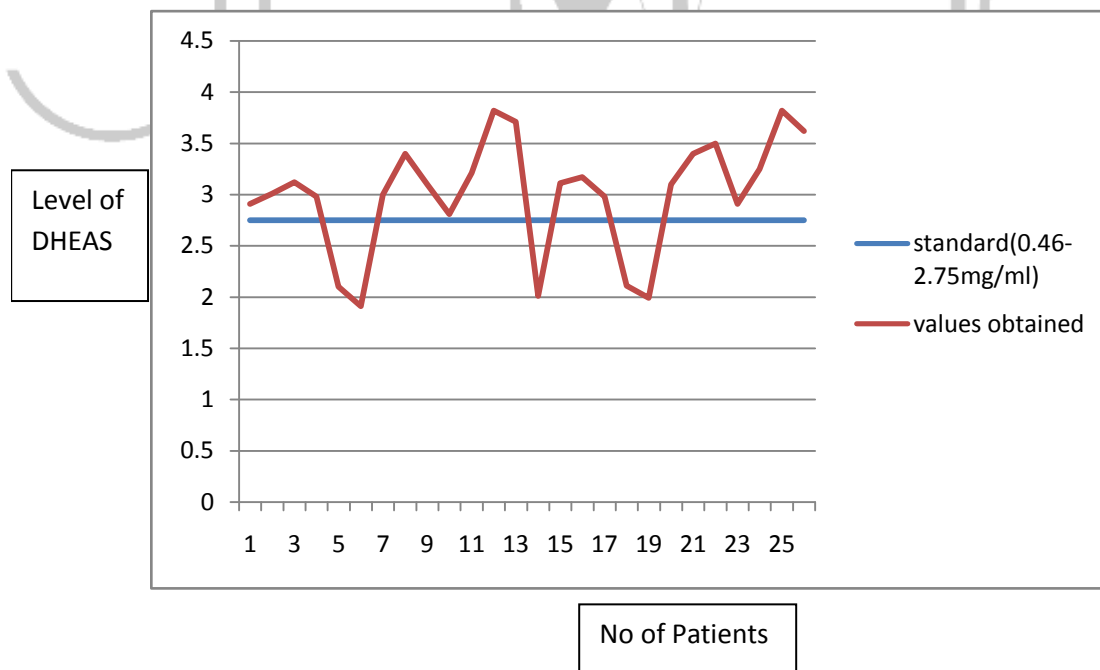


Figure 3 is a graphical representation of the levels of DHEAS in patients in their third trimester of pregnancy, compared with the normal level of DHEAS.

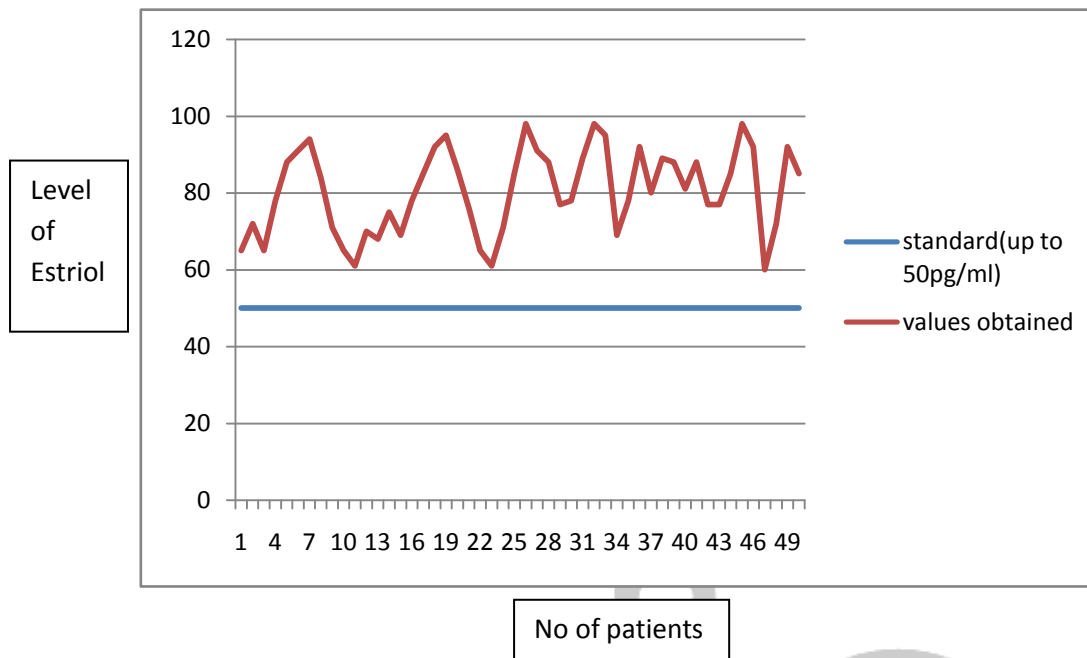


Figure 4 is a graphical representation of the Estriol levels in all the patients, compared with the normal level of Estriol

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