

Research Article

Maternal Dehydro-Epiandrosterone Sulfate Serum Level and Bishop Score in Prolonged Pregnancy

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Corresponding author:** Waleed Fouad Gharib, Department of Obstetrics and Gynecology, Faculty of Medicine, Suez Canal University, Round Road, Ismailia 41111, Egypt**Received:** February 27, 2019; **Accepted:** April 01, 2019;**Published:** April 08, 2019**Abstract*Objective:** To test the relation between pre-induction maternal serum level of dehydro-epiandrosterone sulfate and Bishop score in prolonged pregnancy.**Design:** Observational prospective cohort study.**Setting:** Department of Obstetrics and Gynecology, Suez Canal University Hospitals, Ismailia, Egypt.**Population:** 40 pregnant women with singleton normal pregnancies at gestational age 40-42 weeks were recruited in the study.**Methods:** Data collection included taking a thorough medical history, with emphasis on a detailed obstetric history, doing a complete physical examination. Vaginal examination was done and Bishop Score was recorded. Before initiation of induction a venous blood sample for DHEA-S level assay by ELISA technique.**Results:** There was a highly significant positive correlation between DHEAS serum level and the Bishop score as higher DHEAS levels are associated with higher Bishop Scores ($r=0.32$; $p<0.05$). The mean DHEA-S among those with favorable cervix was much higher than those with unfavorable cervix (92.68 ± 46.88 vs. 64.62 ± 26.27 with significant p value =0.03)**Conclusion:** pre-induction serum DHEA-S correlates positively with Bishop Score and there is possibility to use it as alternative objective option to help anticipation of successful induction of labor in prolonged pregnancy.**Keywords:** Dehydroepiandrosterone sulfate (DHEA-S); Prolonged pregnancy; Bishop Score**Introduction**

Post term pregnancy occurs in 3 to 13% of pregnancies; prolonged pregnancy is associated with significant risks to the pregnant woman, including perineal injury due to fetal macrosomia, high rate of cesarean delivery and labor dystocia. It may be also associated with considerable risks to the fetus such as increased perinatal mortality rate, increased risk of umbilical cord compression from oligohydramnios, low 5-minute Apgar scores, and meconium aspiration [1].

Some studies have shown a reduction in neonatal mortality by routine labor induction at 41st week of gestation. Management of cases of prolonged pregnancy remains a tough situation for the obstetricians [2].

Dehydroepiandrosterone Sulfate (DHEA-S) is a weak androgenic steroid produced by the adrenal cortex of the pregnant female. After birth, output drops to negligible amounts in both sexes, and remains that way until seven years of age. Later on, the adrenal glands gradually resume DHEA and DHEAS production, which accelerates through puberty. DHEA and DHEAS output is maximal between the second third decades and then starts a decline of approximately 2% per year leaving only a residual of 10-20% of the peak production by the eighth of ninth decade of life [3].

Both of them serve as the precursors of approximately 50% of

androgens in men, 75% of active estrogens in premenopausal women, and 100% of active estrogens after menopause [3].

Many studies have done about DHEA-S to understand its role in the pregnant female. It is found that the serum levels of DHEA-S are significantly lower in those requiring pharmacologic intervention than in those progressing spontaneously [4].

Receptors for DHEA-S have been identified on the plasma membranes of human cervical fibroblasts suggesting that this hormone may play a role in cervical connective tissue function [5]. There is also sufficient evidence that DHEA-S has a direct action on uterine collagenase activation [6].

DHEA-S with the previously mentioned relation to cervical connective tissue function and direct action on uterine collagenase is expected to correlate well with the cervical connective tissue changes and consequently Bishop Score.

The aim of this study was to test the effects of DHEA-S on cervical connective tissue and consequently to test the presence of a correlation with Bishop Score.

Patients and Methods**Patients**

This is an observational prospective cohort study which was performed at the department of Obstetrics and Gynecology, ward of

Obstetric emergencies, Suez Canal University hospital. It was designed to study the relationship between pre-induction DHEAS levels and Bishop score in pregnant females with prolonged pregnancies ongoing induction of labor. A total of 40 pregnant women with singleton pregnancies, vertex presentation, sure date at gestational age 40-42 weeks were recruited in the study. Those with fetal congenital anomalies, twin pregnancy, malpresentations, maternal medical diseases like diabetes, abnormally implanted placenta, and obstetric disorders like preeclampsia were excluded from the study.

Methods

After obtaining informed consent all the patients in the study were subjected to Full detailed history, General examination including vital data, Abdominal examination (including fundal level, umbilical girth, and pelvic girths), per vaginal examination to assess Bishop score.

DHEAS measurement

Before termination of pregnancy, five [5] milliliters of venous blood was taken into plain tubes from all these patients and centrifuged immediately; serum stored at -7°C to be analyzed. Collected samples were tested for DHEA-S level by ELISA technique (Diagnostic Products Corporation [DPC], Los Angeles, CA, USA), Serum level of DHEAS was measured using ELISA (Stat Fax[®]2100-Awareness Technology), the Coat-A-Count DHEA-S is designed for quantitative measurement of DHEA-S in plasma and serum. The test can detect as little as $1.1\mu\text{g/dl}$ of DHEA-S.

In the Coat-A-Count DHEAS procedure, ^{125}I -labeled DHEAS competes with DHEAS in the patient sample for sites on antibody coated tubes. After incubation, separation of the bound from free is achieved simply decanting. The tube is then counted in a gamma counter, the count being inversely related the amount of DHEAS present in the patient sample. The quantity of DHEAS in the sample is determined by comparing the counts to a calibration curve. The reagent should be incubated for 30 minutes. The test can detect as little as $1.1\mu\text{g/dl}$.

Outcome

Assessment of the relationship between pre- induction Maternal serum level of DHEAS and Bishop score.

Statistical analysis

Descriptive statistics for measured variables were expressed as range, mean and standard deviation (for metric data); and number and proportions (for categorical data).

The gestational age among the studied group ranged from 281 to 292 day with mean 284.62 day. Regarding bishop score it ranged from 2 to 9 with mean 5.65 (Table 1).

There was significant positive correlation between serum DHEA-S and Bishop score ($r=0.32$ and p value= 0.04) (Table 2).

The mean DHEA-S among those with favorable cervix was much higher than those with unfavorable cervix (92.68 ± 46.88 vs. 64.62 ± 26.27 with significant p value = 0.03) (Table 3).

Discussion

Prolonged pregnancy is associated with significant risks to the pregnant woman, including labor dystocia, perineal injury due to fetal

Table 1: Clinical data of the studied group.

Variable	
Gestational age (day)	
Mean \pm SD	284.62 \pm 2.93
Range	281 - 292
Bishop score	
Mean \pm SD	5.65 \pm 1.58
Range	9-Feb
Parity	
Primigravida	40%
Para 1-2	35%
Para 3-4	15%
Para \geq 5	10%

Table 2: Correlation between DHEA-S and Bishop Score.

Variable	DHEA-S	
	(n=40)	
	r	P
Bishop score	0.32	0.04*

r: Spearman's correlation; *: Significant ($P<0.05$); Pearson's correlation coefficient (for metric variables) used to estimate association between variables. Microsoft[®] Excel[®] (version 2007) and SPSS[®] for Windows[®] version 15.0 were used for data presentation and statistical analysis [7].

macrosomia and high rate of cesarean delivery. It is also associated with considerable risks to the fetus such as increased perinatal mortality rate low 5-minute Apgar scores, increased risk of umbilical cord compression from oligohydramnios and meconium aspiration. Labor induction offers the alternative to such complications when continuation of pregnancy is no longer beneficial to the mother or her fetus.

Dehydroepiandrosterone Sulphate (DHEA-S) is a weak androgenic steroid produced by the adrenal cortices of the pregnant women and fetus. [6].

Previous studies suggested that maternal serum levels of DHEA-S were significantly lower in those clinically requiring augmentation than in those progressing spontaneously through labour [8], so this study was designed to provide clinical support for the relationship between pre induction maternal serum level of DHEA-S and Bishop score in prolonged gestation, with the aim that the DHEA-S levels could be used as an objective alternate comparable to Bishop score.

A total of 40 pregnant women at gestational age between 40 and 42 weeks of pregnancy, sure of dates, with singleton pregnancies and vertex presentation were admitted in the hospital and recruited to the study.

The study participants were matched by the personal and clinical characteristics. The mean age of the participants was 26.18 ± 5.49 years, the mean gestational age was 284.6 ± 2.9 days. The distribution of parity among the study participants shows that Primigravida represented the highest percentage of the study participants as it was (40%) of cases, while para 1-2 was (35%), para 3-4 was (15%) and para 5-6 represented (10%).

The mean Bishop Score among the study population was

Table 3: The mean Dheas among those with favorable and unfavorable cervix.

DHEA-S (µg/dl)	Bishop>6	Bishop≤6	P value
Mean	92.68±46.88	64.62±26.27	0.03
Median	89.32	53.97	
Range	19.2-205.4	46.8-103.7	

5.65±1.58. In the present study, there was a highly significant positive correlation between DHEAS serum level and the Bishop score as higher DHEAS levels are associated with higher Bishop Scores ($r=0.32$; $p<0.05$).

the results of this work agree with Sherif et al., who found that there was a significant direct correlation between serum DHEA-S and Bishop's score (a higher DHEA S is related to a higher Bishop's score ($r=0.785$; $P<0.001$)). This may be explained by the fact that increased Bishop Score denotes cervical ripening & DHEAS plays a role in cervical connective tissue function [5]. Meaning that increased DHEAS serum level leading to more softening and ripening of the cervix leading to increased Bishop Score [14,15].

Again this work came consistent with that of Dogany et al., work which was carried on 65 post-term pregnant women and reported that maternal serum levels of DHEAS were found to be in accordance with Bishop Scores, and it may be an important factor influencing labor efficiency and success of labor induction [16].

This finding also agrees with that study of Liapis et al., which reported an association between higher Bishop Scores and higher DHEAS levels. Moreover, they found no such correlation with estradiol, estriol, progesterone, or cortisol, suggesting a direct role for DHEAS (and not its metabolites) in uterine collagenase activation. [16].

Koyuncu et al., showed that Serum concentration of S-DHEA was significantly higher ($p<0.005$) in women with a favorable Bishop score (>6) compared with those with an unfavorable score. These findings suggest that a rise in DHEA-S level occurs before modifications in the cervix [16,17].

This accordance between this work and the previously mentioned studies leaves no doubt that there is a strong association between the maternal serum level of DHEA-S and cervical changes (represented by Bishop score) which occur as a preliminary step for labor. Such strong, significant and repeated finding support definitely the positive role of DHEA-S in cervical tissue ripening and augmenting collagenase activity in preparation for vaginal delivery.

Another important finding in this work is that the mean DHEA-S level among those with favorable cervix (Bishop score >6) was much higher than those with unfavorable cervix (Bishop score ≤ 6) [92.68±46.88 vs. 64.62±26.27, respectively with p value=0.03]. Since pregnant women with favorable cervix are more liable to successful vaginal delivery, the previous finding denotes indirectly that pregnant women with higher DHEA-S level are more liable to successful vaginal delivery this concept has been observed in several studies. A recent study by Okunowo et al., 2017 evaluated maternal serum levels of DHEA S in spontaneous labor and its association with successful labor at term. Serum DHEA S levels were higher among parturients with successful labor compared with women with unsuccessful outcome ($P<0.001$) [8].

In a study that was carried by university of Arizona Health Center, Macuilla et al., 1998 included (161) pregnant women of more than 41 weeks. In that study, the levels of DHEAS were higher in women who achieved successful induction (mean=109.01µg/dl) compared to women with unsuccessful attempts (mean=58.78µg/dl) [11].

Again, in a study carried out by Nathan IM. (2002) on 40 pregnant women of more than 41 weeks, 80% was successful, 20% was failed, the mean of DHEAS level was (84.27µg/dl) and (33.82µg/dl) respectively [12].

The present study also agrees with another study carried out in Vali-e-asr Hospital, Tehran, Iran by M. Modarres-Gilani and N. paykari, (2003) on 45 women with post-term pregnancy, in which the mean (\pm standard error) dehydroepiandrosterone sulfate level was significantly higher in women with successful induction compared with those with unsuccessful attempts (48.63±6.53µg/dl) versus (26.86±5.17µg/dl), respectively ($P=0.035$). The previous finding also agrees with a study that was carried out in Egypt at Ain Shams University-Maternity Hospital by Sherif et al., (2013) on 50 pregnant women of more than 41 weeks, and reported that

Successful induction was 74% compared to 26% for failed induction. The mean of DHEAS level was (108.2µg/dl) and (44.7µg/dl) respectively [13,14].

The present study also agrees with a study carried out at kasr El Aini Hospital in 2015 on 82 pregnant women at gestational age between 40-42 weeks and reported that successful induction was 75.6% compared to 24.4% for failed induction. The mean of DHEAS level was (81µg/dl) and (24µg/dl) respectively.

Conclusion

Serum DHEA-S correlates well with Bishop Score and can be considered an important predictor for the success of labor induction. It has the advantage of being objective method for prediction of successful labor induction, as it doesn't depend on different observers like Bishop Score. We concluded that pre-induction serum DHEA-S assay can be used beside clinical assessment and Bishop Score to anticipate in a successful induction of labor in prolonged pregnancy.

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