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Assessment of Renal Functions among Saudi Arabian Pregnant Women in Jazan Region.

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Abstract: Introduction: Marked renal hemodynamic changes are apparent by the end of the first trimester. Both the Glomerular filtration rate and effective renal plasma flow increase by 50% of pregnant women. Effective renal plasma flow probably increases to a greater extent, and thus, the filtration fraction is decreased during early and mid-pregnancy. **Objectives**: To assess the serum levels of renal functions among Saudi Arabian Pregnant women in Jazan region. **Materials and Methods:** a prospective, case- control hospital based study conducted in Jazan region from March 2014– June 2015.30 pregnant women selected in Jazan General Hospital and assessed for renal function tests. 30 healthy subjects selected as control group who were age, and socioeconomic matched to the pregnancy group. SPSS was used for data analysis using student's "t" test and Pearson's correlation for assessment of correlation between different variables. Results: There was a significant difference in the mean of the serum levels of urea and creatinine in test group ($p<0.05$) when compared to control group with a significant moderate positive correlation between serum levels of creatinine with the period of gestation. Conclusion: Serum levels of urea and creatinine significantly reduced in Saudi Arabian pregnant women. The progressive decrease in the levels of urea and creatinine through the 3 trimesters of pregnancy suggests an increase in Glomerular filtration rate, probably due to increased cardiac output, renal blood flow and changes in fluid distribution.

Keywords: Pregnancy, Urea and Creatinine.

Introduction

Pregnancy (or gestation) is the development of one or more offspring, known as an embryo or fetus, in the uterus of a woman. A multiple pregnancy involves more than one embryo or fetus in a single pregnancy, such as with twins .Pregnancy also can be define as the carrying of one or more embryos or fetuses by mammals including humans inside their wombs.[1]

Human pregnancy is somewhat arbitrarily divided into three trimester periods of three months each, as a means to simplify reference to the different stages of prenatal development. The first trimester carries the

highest risk of miscarriage (natural death of embryo or fetus). During the second trimester, the development of the fetus can be more easily monitored and diagnosed. The beginning of the third trimester often approximates the point of viability, or the ability of the fetus to survive, with or without medical help, outside of the uterus.[2]

In pregnancy, a woman undergoes dramatic physiological and hormonal changes.[3]. The kidney also undergoes tremendous anatomical and physiological changes. Changes in fluid distribution produces an increase in Glomerular filtration rate (GFR) and lower plasma creatinine. The plasma volume increases during pregnancy sometimes by as much as 50%; these changes are accompanied by alteration in the concentration of many plasma constituents.[4]

Physiological changes occurring in pregnancy involves nearly every organ system and the kidney is not an exception. As a result of these changes, many of the laboratory reference intervals of non-pregnant women are not appropriate for pregnant women.[3]

Urea is a relatively nontoxic substance made by the liver to dispose of ammonia resulting from protein metabolism. The real urea concentration is BUN x 2.14. Normal BUN range is 8-25 mg/dl.BUN is a sensitive indicator of renal disease.[5] The breakdown product of creation phosphate released from skeletal muscle at a steady rate. It is filtered by the glomerulus. It is generally a more sensitive and specific test for renal function than the BUN. Normal range is 0.6-1.3 mg/dl. non pregnant state.[5]

Materials & Methods

This is a prospective, descriptive, cross- sectional, hospital based, case- control study. 30 pregnant women were selected after taking their consent. Each volunteer in this study was asked to come to Jazan General Hospital, for medical assessment and sample collection. 30 healthy subjects were selected as a control group who were age, and socioeconomic matched to the pregnancy group (test group). Clinical data was obtained from the history and recorded on a questionnaire sheet. Clinical assessment of the study group was done by a medical doctor according to the questionnaire filled by those patients; they were not suffering from acute and chronic renal failure. Permission of this study was obtained from the local health authorities in the area of study and the medical director of Jazan General hospital. The objectives of the study were explained to all individuals participating in the study and a written consent was obtained from each participant. 5ml of venous blood was collected from each volunteer included in this study. Serum was separated after clot retraction by centrifugation at 3000rpm for 5minutes at room temperature. The supernatant serum was collected by means of micropipette in tightly sealed container and kept at -20C° till used later. The serum then allowed to at room temperature and investigated of urea and creatinine by using spectrophotometer.

Results

A total number of 30 pregnant women and 30 healthy volunteers as a control group matched for age were evaluated for renal function tests.

Table (1) showed comparison of means of the serum levels of urea and creatinine of the test group and control group. there were a significant difference between the means of the serum levels of urea and creatinine in the test group and control group (P.value = 0.004), (P.value = 0.000) respectively, the mean of urea in the test group is significantly reduce and raised for creatinine.

Figure (1) showed the relationship between the duration of pregnancy in (month) and the serum levels of creatinine among patients with pregnancy. The figure showed a significant moderate positive correlation between the duration of pregnancy in (month) and the serum levels of creatinine (mg/dl) among pregnant women (r =0.5, P =0.000).

Table1: Comparison of means of the serum levels of urea and creatinine of the test group and control group.

Variable	Test group n= 30	Control group n= 30	P. value
Serum urea in (mg/dl) Range	2.3 ± 3.8 (6 – 22.2)	15.6 ± 4.8 (6 – 24)	**0.004**
Serum creatinine in mg/dl Range	0.48 ± 0.12 (0.25 – 0.75)	0.66 ± 0.2 (0.27 – 1.2)	**0.000**

- The table shows the mean ± SD, range in brackets () and probability (P. value).
- t-test was used for comparison.
- P. value ≤ 0.05 is considered significant.

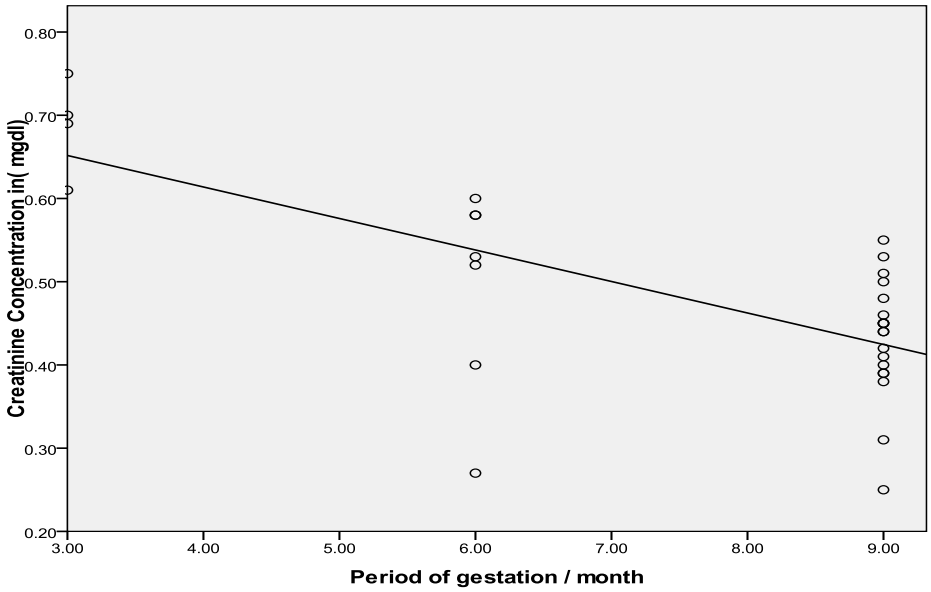

Figure 2: The relationship between the duration of pregnancy in (month's) and the serum levels of creatinine (mg/dl) among pregnant women (r =0.5, P =0.000).

Discussion:

Pregnancy induces marked, and widely varying, circulatory and biochemical changes in women. In most pregnant women there are increases of plasma volume, cardiac output and renal blood flow. The Glomerular Filtration Rate (GFR) rises early in pregnancy and creatinine clearance may be 150 ml/min or more by 30 weeks of pregnancy and this may lead to fall of the creatinine and urea level among pregnant women.[6]

In the study there was a significant difference between the mean of the serum level of urea in the test group when compared with that of the control group, the mean of the test group was significantly reduced as shown in table (Table1) (P. value = 0.002) and this may be due to the increase rate of protein synthesis during pregnancy. This observations consistence with other previous study. [7]

Also there was a highly significant difference between the mean of the serum level of creatinine in the test group when compared with that of the control group, the mean of the test group was significantly reduced as shown in table (1) (P. value = 0.000) and this may be due to increase of GFR during pregnancy which lead to fall of creatinine level in the blood of pregnant women .This finding agrees with previous study who reported that; a reduction of creatinine occur as a result of elevation of Glomerular filtration rate during gestational period which associated with high creatinine clearance.[8]

This study also showed a significant positive correlation between the serum level of creatinine and the period of gestation and this may be due to relatively constant and stable creatinine level during the period of pregnancy (r = 0.5, P = 0.000). This observation agrees with previous study. [9]

Conclusion

This study concluded that there was a significant fall in the means of serum levels of urea and creatinine in Saudi Arabian pregnant women's (Test group) when compared with healthy control group with positive correlations of the creatinine level with the different pregnancy stages. These changes and reduction of urea and creatinine level may be a reflection of fluid distribution rather than a change in urea and creatinine production as well as due to increase in renal blood flow and Glomerular filtration rate caused by increase in cardiac output.

Recommendations

1- Urea and creatinine reduced levels need for special attention among Saudi Arabian pregnant women.
2- Due to the biochemical changes during pregnancy there should be regular follow up of pregnant women to avoid pregnancy complications as possible.
3- Due to circulatory and biochemical changes during pregnancy the clinical chemistry laboratory should assess special reference value for biochemical tests.

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