

Is Supplementation With Coenzyme Q 10 During Pregnancy Effective In Reducing The Risk Of Developing Preeclampsia ?

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Abstract:

Introduction:

Pre-eclampsia is a huge cause of maternal ill health and death. There was a need to study whether CoQ10 supplementation is more efficient for reduction of occurrence of pre-eclampsia if started during early second trimester compared to third trimester, for which this study was planned. It is the only lipid synthesized in body with antioxidant function.

Methods & Materials: RCT at Lady Willingdon Hospital Lahore for a period of 1 year. Total 363 patients were enrolled and divided into three groups. Group A was treated without any intervention, group B was given 100 mg Coenzyme Q10 after 16th week of gestation daily till delivery and group C supplementation started from 24 weeks of gestation until delivery. Women were called for follow every month till 36th weeks and then fortnightly till delivery.

Results: At 38th week: In group A pre-eclampsia was recorded in 27(26.5%) patients, in group B 12(11.8%) patients and in group C 13(13.0%) patients (p-value=<0.05). At 40th week: In group A pre-eclampsia was recorded in 3(17.6%) patients, in group C 0(0.0%) patients and in group B 4(11.8%) patients (p-value>0.05).

Conclusion: Coenzyme Q10 supplementation during pregnancy reduces the risk of pre-eclampsia more effectively if started from early second trimester as compared to third trimester and without any intervention

Introdcution:

Pre-eclampsia is a common syndrome of human gestation affecting 5 to 8 percent of all pregnancies throughout the world and is responsible for huge losses to the lives and health of mother and fetus. The cause of pre-eclampsia is still not fully known, but abnormal placentation with a generalized maternal inflammatory state and endothelial dysfunction are hypothesized by involvement of angiogenic factors, heme oxygenase pathway, nitric oxide pathway.

It has a vital function in electron transport and oxidative phosphorylation at mitochondrial level, stabilization of cell membranes and it is a strong antioxidant. In normal human being during pregnancy from start till the time of delivery the level of CoQ10 increases gradually. In a 2003 study, Teran et al. showed that pre-eclamptic women had lower level of plasma of CoQ10 compared with healthy non-pregnant and pregnant women.

Considering the high maternal mortality and poor fetal outcome attributed to pre-eclampsia/eclampsia in Pakistan, there is a need to study factors that might prevent this potentially lethal condition. There is also need to study whether CoQ10 supplementation is more effective in lowering the risk of pre-eclampsia if started during early second trimester compared to third trimester. The purpose of our study was to determine whether CoQ10 supplementation during pregnancy reduces the risk of pre-eclampsia in predisposed women of our ethnicity taking a trimester-wise approach.

Objective:

To determine, whether supplementation with Coenzyme Q10 (antioxidant) during pregnancy reduces the risk of pre-eclampsia more effectively if started from early second trimester as compared to third trimester.

Methods & Materials:

Study Design: RCT (Randomized Controlled Trial)

Setting: Gynecology and Obstetrics Department Unit II, Lady Willingdon Hospital, Lahore.

Duration of Study: 1 year

Size of sample: Sample size of 363 patients (121 patients in each group) was estimated by using 95% confidence level, 10% absolute precision with expected percentage treatment group as 14.4% and no treatment group as 25.6%.⁶

Methods & Materials:

Sampling Technique: Probability simple random sampling.

Inclusion Criteria: 20-30 years old, History of high blood pressure in previous pregnancy, 16-20 weeks gestation (calculated by last normal menstrual period and confirmed on ultrasonography)

Exclusion Criteria : Primigravida, History of chronic disease related to cardiovascular, endocrine, metabolic or reproductive systems, Multiple gestation (as shown by sonographic evidence)

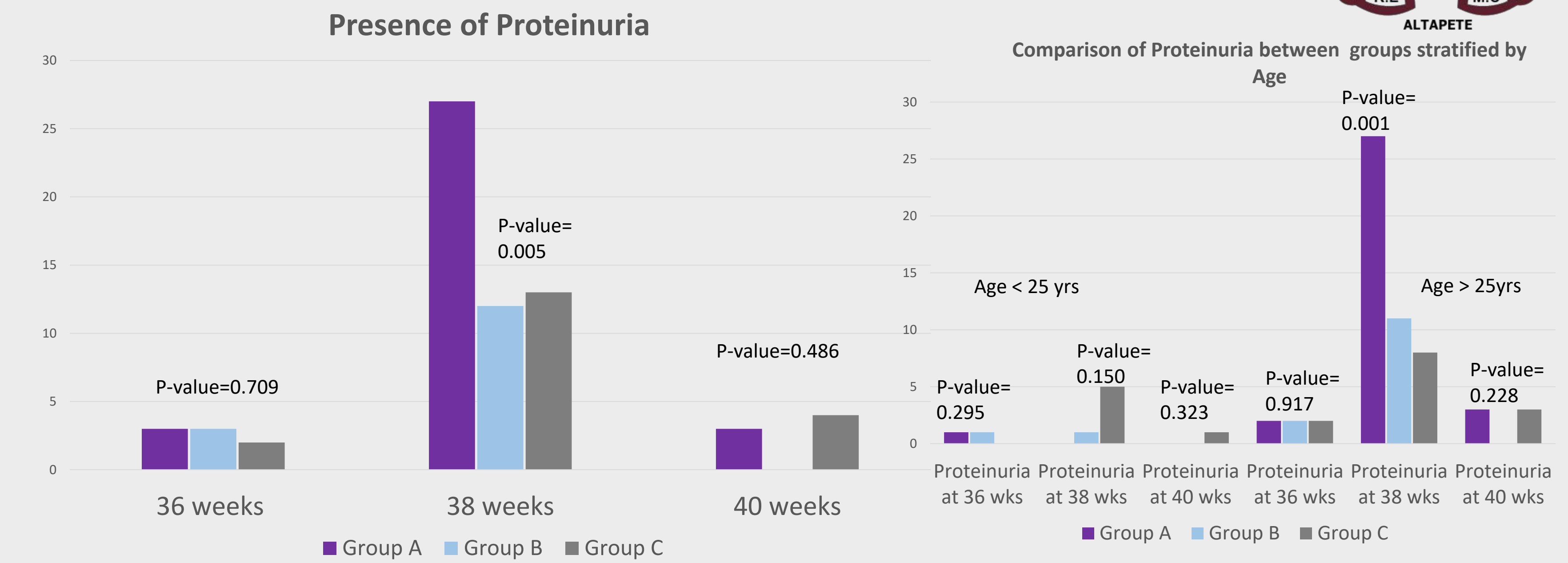
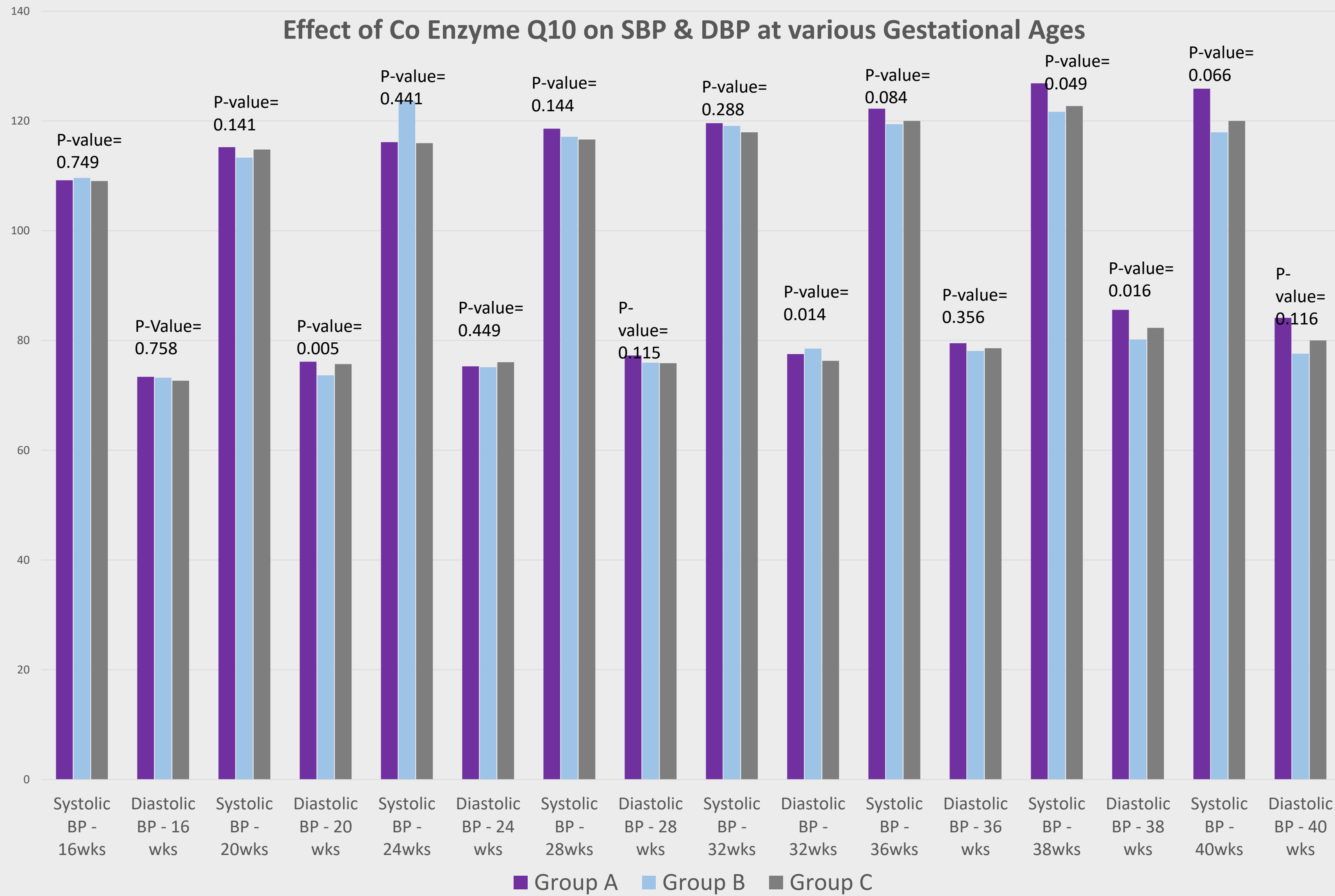
Data Collection: 363 patients meeting the inclusion criteria criteria were enrolled in the study following informed consent. Participants were divided into three equal groups of 121 patients, Group A, B & C. Group A did not receive any intervention. Group B was given Coenzyme Q10 100 mg daily starting from 16 weeks of gestation until delivery. Group C was given Coenzyme Q10 100 mg daily starting from 24 weeks of gestation until delivery. With interval of 4 weeks patients were evaluated until the 36th week and then after 2 weeks interval follow up done until delivery. On each visit, blood pressure and proteinuria were recorded along with relevant documentation of new-onset factors i.e. cerebral or visual symptoms, signs of pulmonary edema, platelet count, serum creatinine and liver transaminases and were managed accordingly. Number of patients developing pre-eclampsia in both groups was recorded.

Data Analysis:

Comparison of three groups for pre-eclampsia was done by applying ANNOVA test. A p-value <0.05 was considered significant.

Results:

The average age of the patients was 27.55±2.45 years. The difference between age groups among study groups was found to be insignificant. i.e. p-value=0.129. At 38th week: In group A pre-eclampsia was recorded in 27(26.5%) patients, in group B 12(11.8%) patients and in group C 13(13.0%) patients (p-value=<0.05). At 40th week: In group A pre-eclampsia was recorded in 3(17.6%) patients, in group C 0(0.0%) patients and in group B 4(11.8%) patients (p-value>0.05).



Disussion:

In this study, at 38th week follow-up, a significant difference was found between proteinuria among study groups. A lower number of patients with proteinuria were observed in group B: the group that started Coenzyme Q10 100 mg daily from 16th week as compared to other groups. Likewise, most patients ending up with proteinuria were from the group not receiving any intervention.

A study by Tiano et al, concluded that CoQ10 on endothelial function puts a positive effect. CoQ10 can perform a vital protective role in pre-eclampsia during pregnancy as endothelial dysfunction is well-known to play a pathogenetic role.

One study by Farheen Shaikh et al demonstrated that on comparison with control group(1.08±0.37) the pre-eclamptic patients' (0.22±0.09)µg/dl µg/dl the level of plasma Co-Enzyme Q10 decreased with significant difference of p<0.05.

There is a lack of number of studies done on level of CoQ10 during pregnancies . And according to those few studies the level of CoQ10 rises gradually with pregnancy, this level changes from first trimester to time of delivering the baby. Analysis of study by Hernandez et al resulted that on comparing supplemented groups and no difference in control group in CoQ10 only before the 20th week of gestation.

Conclusion:

It is concluded that with use of Coenzyme Q10 (antioxidant) the risk of occurrence of pre-eclampsia can be minimized by supplements more effectively if started from early second trimester as compared to third trimester and without any intervention. It is recommended that Coenzyme Q10 (antioxidant) supplementation must start early in patients with high risk of pre-eclampsia to avoid complications.

Limitations:

The results seemingly appear inconsistent when compared across the groups and a few results came out to be statistically insignificant. One possible reason is an inadequate sample size. Hence, it is also recommended that further works should be done with larger sample sizes and more varied groups so we more certain about our findings. Another limitation is lack of statistical consideration of potential confounding factors like weight, anemia, socioeconomic status, diet, exercise and diabetic disease.

References:

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2. Hernandez I, Vivero S, Racines-Orbe M, Calle A, Molina G, Teran E. Placental and mitochondrial Q10 content after CoQ10 supplementation during pregnancy. *Free Radical Biology and Medicine*. 2017;108:S77.
3. Tiano L, Belardinelli R, Carnevali P, Principi F, Seddaiu G, Littarru GP. Effect of coenzyme Q10 administration on endothelial function and extracellular superoxide dismutase in patients with ischaemic heart disease: a double-blind, randomized controlled study. *European heart journal*. 2007;28(18):2249-55.