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### Spatial and verbal memory in different trimesters of pregnancy: A prospective study

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#### ABSTRACT

The present study was aimed to observe spatial and verbal memory changes during different trimesters of pregnancy. The present study has been conducted in 80 Antenatal patients (20-35 years) who were diagnosed with pregnancy for the first time without any pathology. Spatial and verbal memory test was used to assess cognition. Data was analyzed by SPSS 20.0. Data was presented as mean  $\pm$ SD and P value  $<0.05$  was considered as significant. One way ANOVA followed by Tukey HSD Post-hoc Test was applied to observe the significance. Significant decrease in spatial memory was observed in second and third trimesters, when compared with first trimester. Verbal memory was not significantly changed in second trimester. However, in third trimester verbal memory decreased significantly when compared with second trimester. We have observed decline in memory during pregnancy. However, generalizations are not possible in this area as the study was conducted in only one centre. We recommend similar studies with higher sample size and involving multiple centers to understand the cognitive changes during pregnancy.

**Keywords:** Pregnancy, Memory, Cognition, Trimesters.

#### INTRODUCTION

Women may be more prone to experience memory problems during pregnancy [1]. It was reported that the performance of pregnant women was very poor in memory and cognition tests [2,3]. In contrast, animal studies reported improvement in spatial memory during pregnancy [4]. However, the memory tests used in animals and humans are different. Earlier

human studies have reported that No significant differences was observed in cognition as a function of pregnancy or motherhood, although late pregnancy was associated with deterioration on one of four tests of memory and cognition [5]. The present study was aimed to observe spatial and verbal memory changes during different trimesters of pregnancy.

**Study design:** Prospective study

## MATERIALS AND METHODS

The present study has been conducted in Department of Obstetrics and Gynecology and Department of Biochemistry, GEMS hospital, with 80 Antenatal patients (20-35 years) who were diagnosed with pregnancy for the first time without any pathology. Willing subjects (Pregnant women of 1st trimester), who came for antenatal check up to the centre, were randomly selected. Unwilling participants were excluded from the study. Spatial and verbal memory scores were recorded in all the three trimesters and compared.

### Verbal and spatial memory test

The test material was projected on a screen, allowing 10 seconds for each slide. After the 10 slides were shown, a mathematical problem was projected on the screen. Immediately after this, the subjects were asked to recall and write down (or in the case of spatial memory, to draw) within 60 seconds the 10 test items which had been shown to them. For both verbal and spatial memory tests, a correct answer was scored as "1" and a wrong answer was scored "0" [7].

### Ethical considerations

The study was approved by Institutional Ethics Committee. A written, informed consent was obtained from all the participants. The study was carried out in accordance with the "Ethical Guidelines for Biomedical Research on Human Participants, 2006" by the Indian Council of Medical Research and the Declaration of Helsinki, 2008. The respondents were given assurance of confidentiality.

### Statistical analysis

Data was analyzed by SPSS 20.0. Data was presented as mean  $\pm$ SD and P value  $<0.05$  was considered as significant. One way ANOVA followed by Tukey HSD Post-hoc Test was applied to observe the significance.

## RESULTS

Significant decrease in spatial memory was observed in second and third trimesters, when compared with first trimester. Verbal memory was not significantly changed in second trimester. However, in third trimester verbal memory decreased significantly when compared with second trimester.

Table 1: Levels of depression, Anxiety & stress levels at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> trimesters

Variables	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester	F value	P value
Spatial memory	6.52 $\pm$ 2.1	5.66 $\pm$ 1.34	4.32 $\pm$ 1.6	33.6552	0.0000***
Verbal memory	4.23 $\pm$ 2.7	4.82 $\pm$ 1.87	3.6 $\pm$ 2.33	5.5092	0.0046**

Data was presented as mean  $\pm$ SD. (\* P $<0.05$  is significant, \*\*P $<0.01$  is significant, \*\*\*P $<0.001$  is significant)

## DISCUSSION

Understanding effect of pregnancy on cognition is complex as some studies have reported that no negative cognitive impacts of pregnancy and motherhood were observed [6]. In contrast other studies have reported decline in memory during pregnancy period [8,9]. Henry and Rendell explained in their review that the contradictory results with respect to memory decline in pregnant women may have been caused by the use of different methodologies, the testing of distinct memory processes, and the small sample sizes often employed in examining cognitive change in pregnant women [10]. Other researchers reported that pregnancy related cognitive changes are due to cultural

expectations [11]. Animal studies have reported positive impact of pregnancy on memory [4]. However, animal study results can't be exactly interpreted in humans. In the present study we have observed decline in memory in pregnancy.

## CONCLUSION

We have observed decline in memory during pregnancy. However, generalizations are not possible in this area as the study was conducted in only one centre. We recommend similar studies with higher sample size and involving multiple centres to understand the cognitive changes during pregnancy.

**Conflicts of interest:** nil

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