

## Comparison of mean Triglyceride levels in third trimester of Pregnancy in a Patients with and without Pre-Eclampsia

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### ABSTRACT

**Objective:** To compare the mean triglyceride levels in women with and without pre-eclampsia during third trimester of pregnancy.

**Study Design:** Cross sectional study.

**Place and Duration:** At Obstetrics and Gynecology Department of Aziz Bhatti Shaheed Hospital Gujrat, from 1<sup>st</sup> July 2020 to 30<sup>th</sup> Dec 2020.

**Methodology:** In the study 150 pregnant women were included. Pre eclampsia was diagnosed if the women had high blood pressure and proteinuria. Group-A included women having pre-eclampsia and group B women without pre-eclampsia. Serum triglyceride levels were measured by hospital laboratory. For mean triglyceride levels analysis independent sample t-test was used and P-value  $\leq 0.05$  was taken as significant.

**Results:** The mean triglyceride level was  $234.29 \pm 18.88$  mg/dl in women with pre-eclampsia while  $142.33 \pm 25.08$  mg/dl in women without pre-eclampsia. The difference was statistically significant ( $p=0.001$ ). The effect on mean triglyceride level was independent of age and parity.

**Conclusion:** Serum triglycerides levels were high in pre-eclamptic women compared to women having normal blood pressure.

**Keywords:** Pregnancy, Hypertension, Pre-eclampsia, Proteinuria, Third trimester, Triglycerides

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### INTRODUCTION

Pre-eclampsia affects approximately 2-8% of pregnancies worldwide.<sup>1,2</sup> It is characterized by hypertension and proteinuria

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that develops after 20 weeks of gestation and resolves as pregnancy ends.<sup>3,4</sup> It is diagnosed by blood pressure readings of  $\geq 140/90$ , or a 30mmHg rise in systolic reading of blood pressure or a 15mmHg increase in diastolic reading of blood pressure, along with  $\geq 300$ mg of proteins in urine collected over 24 hours, all of this occurring after 20 weeks of gestation.<sup>5</sup> This disorder of pre-eclampsia involves multiple body systems and is a common complication and a substantial reason for maternal suffering through eclampsia, HELLP syndrome, acute kidney injury preterm delivery and perinatal death.<sup>6-8</sup>

Pre-eclampsia usually occurs in late second and third trimester affecting biochemical and metabolic processes in our body, hence contributing to fetal complications.<sup>9-12</sup> Various arterial lesions are seen at the implantation site at uteroplacental level in patients of pre-eclampsia. These types of lesions are seen in acute atherosclerosis and they include areas of fibrinoid necrosis and macrophages which are lipid laden and encircling them. These changes are even seen in non-pregnant hypertensive patients. Glomerular endotheliosis is seen in patients of pre-eclampsia, which is characterized by lipid deposits in glomeruli. And these glomerular lesions which are seen along with proteinuria are marker for intensity of disease.<sup>5</sup> Oxidative stress is seen in pre-eclampsia because of increase in reactive oxygen species and lipid peroxides, leading to imbalance in prostaglandin cascade further resulting in vasospasm in brain, kidney, uterus and placental vessels.<sup>9</sup>

Serum triglyceride level above 1.6 mmol/l is defined as hypertriglyceridemia and fetal atherosclerosis has been seen with deranged lipid profile.<sup>13</sup> so raised lipid levels in predisposed women can carry increased risk for maternal-fetal complications.<sup>14-16</sup>

Pregnancy is a hyper estrogenic state and this causes the synthesis of endogenous triglycerides through VLDL.<sup>5</sup> These triglycerides get accumulated in arteries causing endothelial damage especially in uterine spiral arteries by making dense small particles of LDL.<sup>17</sup> Leptin levels are also seen to be increased in pregnant women with pre-eclampsia.<sup>18</sup> Few studies have shown that the derangement in lipid profile is associated with dysfunction in endothelial lining and a decrease in ratio of prostacyclin and thromboxane A2 which leads to pregnancy hypertension and pre-eclampsia. Few evidences have been found that abnormalities in lipid metabolism seen in early pregnancy increase the risk of pre eclampsia.<sup>11</sup> Therefore, measuring lipid profile can have good predictive value for pre eclampsia and eclampsia, which avoids the need for expensive endocrine profile. So, measuring serum lipid parameters, can have a good predictive value for toxemia of pregnancy, and thus avoiding the need for doing costly endocrine profile.<sup>19</sup>

Almost 10 to 15% of maternal deaths are due to eclampsia and pre eclampsia so we can improve maternal and fetal outcomes by timely treating these patients.<sup>20</sup> Very few local studies<sup>21-23</sup> with small sample sizes have been done to find relationship of serum triglycerides with pre-eclampsia in our pregnant women. The objective of study was to compare the mean triglycerides levels of pregnant women with and without pre-eclampsia in third trimester. The rationale of this study was that if elevated serum triglyceride levels were found among pre eclamptic women, then by using it as a screening test, we would be able to identify these high risk patients in future. By early detection, close surveillance and timely management we can reduce fetomaternal morbidity and mortality in our patients.

## METHODOLOGY

This cross sectional study was conducted at Obstetrics and Gynecology Department of Aziz Bhatti Shaheed Hospital Gujrat, from 1<sup>st</sup> July 2020 to 30<sup>th</sup> Dec 2020, after approval by ethical committee.

Pregnant women of age 18 to 40 years with singleton pregnancy at gestational age more than 32 weeks according to last menstrual period were included in study. Women with chronic hypertension, eclampsia, gestational diabetes and taking anti lipid drugs or statins were excluded from the study.

A total of 150 females, who fulfilled the selection criteria, were enrolled in study. Informed consent was taken verbally in selected patients along with Demographic details and detailed medical history which was noted on predesigned proforma. Blood pressure and proteinuria by dipstick method were checked by a staff nurse. Serum triglyceride levels were done by hospital laboratory. To avoid bias, the raised blood pressure readings were again confirmed by post graduate trainee. Patient was labelled as having Pre-eclampsia in the presence of high

blood pressure readings and proteinuria. Two groups were formed. In Group A women having pre-eclampsia and in Group B women without pre-eclampsia were included. All the information was collected on a pre-designed proforma.

**Data Analysis:** Data analysis was done by SPSS version 20. For socio-demographic characteristics like age, parity and gestational age at delivery, Chi square test was used to compare the two groups. The primary outcome measure was serum triglyceride level, for which mean and standard deviations were calculated and comparison between pre eclampsia and without pre eclampsia groups was done by applying independent sample t test. p Value of < 0.05 was taken as significant. In sub group analysis, to find effect of age and parity on triglyceride levels, Chi square test was used.

## RESULTS

In this study, 80 women (53.3%) had pre-eclampsia while 70 women (46.67%) did not have pre-eclampsia. The mean age of patients was 28.61±6.30 years, with majority of patients (n=85,57%), were between 18 to 29 yrs. The difference in age between the two groups was insignificant statistically (p=0.078). The highest frequency of pre-eclampsia was noted in age group 30 to 40 years (n=65, 61.3%) Among the women included in study, 38 (25.33%) females were primigravida and 112 (74.6%) were multigravidas. Among multigravidas 07 (18%) had parity 1, 37 (24.67%) had parity 2, 30 (20%) had parity 3 and 18 (12%) had parity 4 and above. Pre-eclampsia was more common in multigravidas patient (55%) as compared to primigravids (37%). The mean gestational age of women studied was 36.23±2.25weeks. There was no statistically significant difference (p=0.774) with regard to gestational age at presentation in both groups as shown in (Table- I).

**Table – I: Comparison of socio demographic characteristics (N = 150).**

	Total N=150	Pre- Eclampsia n=80	No Pre- Eclampsia n=70	p Value
Age in years	18-29 (n=85)	40 (47.1%)	45 (52.9%)	0.078
	30-40 (n=65)	40 (61.5%)	25 (38.5%)	
Parity	Primigravida (n=38)	14 (36.8%)	24 (63.2%)	0.027
	Multigravida (n=112)	66 (55.25%)	46 (44.75%)	
Gestational Age in weeks	33-36 (n=86)	45 (52.3%)	41 (47.7%)	0.774
	37-40 (n=64)	35 (54.7%)	29 (45.3%)	

While comparing mean triglycerides levels, we noted that levels were higher in patients who developed pre-eclampsia (234.29±18.88mg/dl) as compare to females without pre-eclampsia (142.33±25.08mg/dl) The difference was significant statistically (p=0.001) (Table-II).

The effects of age and parity on triglyceride levels were also compared between the two groups as shown in table III. The

mean triglyceride levels were high in patients in pre-eclamptic group irrespective of age and parity.

**Table – II: Comparison of mean triglycerides in pre-eclampsia and no pre-eclampsia group (N = 150).**

Group	No of Women(n)	Mean Triglycerides	S.D Value	p Value
Pre-eclampsia	80	234.29	18.88	0.001
No Pre-eclampsia	70	142.33	25.08	

**Table – III: Comparison of triglyceride levels with age and parity in women with pre-eclampsia and no pre-eclampsia group (N = 150).**

Demographic characteristics		Mean Triglycerides		p Value
		Pre-Eclampsia	No Pre-Eclampsia	
Age in years	18-29 (n=85)	234.68±18.9	143.20±25.22	0.001
	30-40 (n=65)	233.90±19.09	140.76±25.27	
Parity	Primigravida (n=38)	232.93±18.85	135.25±22.97	0.001
	Multigravida (n=112)	232.64±13.56	145.81±26.05	

## DISCUSSION

In the present study, we compared the serum triglyceride levels in women with and without preeclampsia. The mean age of patients was  $28.61 \pm 6.3$  years in our study, while mean maternal age in another study was  $29.21 \pm 3.76$  years which is very close to patients age in this study.<sup>24</sup> In our study the highest frequency of pre-eclampsia was noted in the age group of 30 to 40 years. Our findings were closer to studies by Siddiqui and Anuradha which observed that the mean age of women with preeclampsia was 29.6 years and 26.85 years respectively.<sup>11,25</sup>

In our study 55.2% patients who had pre-eclampsia were multigravida, while 36.8% were primigravida. Study conducted by Jin documented a high prevalence of 83% among nulliparous and 16.7% in multiparous.<sup>24</sup> The reason for this difference is not clear.

Majority of patients (56%) with pre-eclampsia presented between 33 to 36 weeks of gestation and the mean gestational age was  $36.23 \pm 2.25$  weeks. Wen Yuan Jin showed mean gestational age of  $38.84 \pm 1.22$  weeks<sup>24</sup> which is close to results of our study. He calculated an increased risk of pre-eclampsia, gestational diabetes mellitus and intrahepatic cholestasis of pregnancy in patients with deranged lipid profile.

The mean triglyceride level in our study was 142.33 in control group, while it was significantly higher in pre-eclampsia group with the value of 234.29 mg/dl. Study conducted by Siddique I concludes that there is a positive correlation between high triglyceride levels and pre eclampsia.<sup>25</sup> Maternal dyslipidemia and severity of preeclampsia was evaluated in a study by Musa et al. The researchers found significantly deranged lipid profile in pre eclamptic and eclamptic women, which was directly proportional to disease severity. His study showed mean  $\pm$  S.D of triglycerides in pre-eclampsia of  $2.4 \pm 0.9$  mmol/l which was

significantly higher when compared to the controls with value of  $1.9 \pm 0.6$  mmol/l ( $P < 0.05$ ).<sup>10</sup> Jin observed that every mmol/l rise in maternal third trimester triglycerides concentration was associated with an increased risk of pre-eclampsia ( $P = 0.002$ ,  $AOR = 1.50$ ,  $95\%CI = 1.16-1.93$ ).<sup>24</sup>

Deshpande HCM et al reported significantly high cholesterol (HDL, LDL, VLDL) and triglyceride levels in pre eclamptic women compared to normotensive women ( $P < 0.001$ ).<sup>19</sup> Altered lipid levels results in linoleic acid stimulated oxidative stress which leads to endothelial dysfunction. This is one of the pathophysiologic phenomenon responsible for development of preeclampsia. All the studies discussed above supported the findings of our study.

Few Pakistani and local studies of small sample sizes has also shown results similar to our study. Nazli studied 86 patients and calculated 29.5% higher triglycerides levels in women who had pre-eclampsia as compared to normotensive women.<sup>23</sup> Another study by Joy et al showed mean ( $\pm$ SD) serum triglyceride level was  $248.90 \pm 31.36$  mg/dl in pre eclampsia and  $197.00 \pm 27.04$  mg/dl in controls, showing a significant and positive correlation between pre eclampsia and hyper triglyceridemia.<sup>26</sup> So regarding triglyceride levels, our results are consistent with the results of above studies.

In the subgroup analysis, we observed that serum triglyceride levels were high in pre-eclamptic women irrespective of age and parity. These results are supported by the finding of Nisar's study which showed no significant association of hypertriglyceridemia with age ( $p = 0.284$ ) and parity ( $p = 0.526$ ).<sup>22</sup>

Limitation of our study is that we did not investigate serum triglycerides in early pregnancy as it was not cost effective and most of our patients had late antenatal booking. A large multicentre cohort study is needed to establish the association of high serum triglyceride levels in early pregnancy with pre eclampsia and eclampsia. There is a need for further studies to establish optimization of preconception serum triglycerides and risk of pre eclampsia.

## CONCLUSION

Serum triglycerides levels were high in pre-eclamptic women compared to women with normal blood pressure.

**Recommendation:** Further studies are needed to compare and establish correlation between triglyceride levels in first trimester and risk of pre-eclampsia so we can focus more on those high risk women before they develop complications and manage them timely.

## AUTHOR'S CONTRIBUTION

**Riaz M:** Manuscript Writing, Statistical Analysis, Literature search, Proof reading and final approval

**Naz T:** Conceived Idea, Designed Research Methodology

**Kalsoom S:** literature search, Proof reading and final approval

**Laila U:** Data Collection and analysis

**Nisa K:** Data analysis

**Safdar F:** Manuscript writing.

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