

# Comparison of Blood Glucose Level in Different Trimester with Stress, Anxiety Depression among Young Pregnant Females

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## ABSTRACT

**Background:** Psychological health affects numerous physiological processes of the body. The psychological well-being of pregnant women is a global concern.

**Aim:** To compare the blood glucose level (random) in normal versus stress, depression and anxiety among pregnant women (Trimester wise) in district Hyderabad.

**Methods:** A cross-sectional study (survey-based) was conducted in a fixed time frame. The pregnant women were randomly selected and segregated into three groups (trimester wise). The sample size (n) was 123. Random blood glucose level was measured by using the check UC-1001. Stress, anxiety and depression were analyzed by using a valid questionnaire DASS-21. Student t-test was employed as appropriate. Data is shown as mean±standard deviation.

**Results:** Blood glucose level was observed significantly higher (*P*-value: 0.0004, 0.009 and 0.046) in stressed women (137.82 ±28.94, 142.60 ±40.34 and 126.82 ±35.92) as compared to normal (107.6 ±18.01, 115.05 ± 18.68 and 105.53 ±21.56). Similarly, the blood glucose level was observed higher (*P*- values: 0.043, 0.065 and 0.078 in depressed women (128.62 ±29.85, 136.79 ±37.10 and 122.44 ±33.41) as compared to normal (105.62 ±13.71, 112.22 ±24.60 and 101.22 ±18.66). An elevated blood glucose level (*P*-value in First, Second and Third trimester was 0.230, 0.065 and 0.900 respectively) was observed in those who were suffering from Anxiety (125.63 ±29.27, 136.79 ±37.10 and 121.81 ±32.36) as compared to those whose blood glucose level is normal (107.25 ±17.85, 112.22 ±24.61 and 123.66 ±37.04).

**Conclusion:** An elevated blood glucose level was observed in all three trimesters in stressed, depressed and anxious pregnant women.

**Keywords:** Anxiety, Depression, Stress, Blood Glucose. Trimester

## INTRODUCTION

Adolescent pregnancy is one of the major public health problems declared by the world health organization (WHO) and thus could affect the health of the mother and forthcoming baby (Flores-Valencia, Nava-Chapa, & Arenas-Monreal, 2017). Pregnancy has always been linked with stress. According to an Indian study, a significant proportion suffered stress and anxiety (Aneja et al., 2018). Another study reported anxiety, depression and stress 63%, 25.5% and 23%, respectively, among pregnant women (Priya, Chaturvedi, Bhasin, Bhatia, & Radhakrishnan, 2018). The prevalence of depression, anxiety and stress among pregnant women in Chongqing (China) was 5.19%, 15.04% and 91.86%, respectively, in early pregnancy (Tang, Lu, Hu, & Zhong, 2019). Additionally, another Chinese study reported the trimester wise prevalence of depression and anxiety, the depression was 35.7%, 24.0% and 26.1%, and anxiety was 22.7%, 17.4% and 20.8% in all three trimesters (Zhang et al., 2018).

Depression, stress and anxiety in pregnant women with reference to miscarriage have been reviewed (San Lazaro Campillo, Meaney, McNamara, & O'Donoghue, 2017). Psychological stress could be linked with the risk of adverse pregnancy impacts such as preterm birth and low birth rate (Barrett et al., 2018; Cole-Lewis et al., 2014). Recently, attempts were made to link the COVID-19 era and stress, anxiety and depression in pregnant and/or post-partum women (Effati-Daryani et al., 2020; Stepowicz, Wencka, Bienkiewicz, Horzelski, & Grzesiak, 2020). A meta-analysis revealed 30% depression, anxiety 34%, and both depression and anxiety was 18% during covid-19 (Sun, Zhu, Tao, Ma, & Jin, 2021).

Because the pregnancy and its maintenance require complex efforts of the neuroendocrine system, hence the fluctuation in cortisol, epinephrine/norepinephrine, and blood glucose level could hamper the normal tone of the pregnancy.

The purpose of the study was, thus, to compare the blood glucose level and its association with stress, anxiety and depression in all three trimesters in pregnant women. The study also aimed to determine the difference between blood glucose levels and stress, anxiety, and depression in all three trimesters.

## MATERIALS AND METHODS

A cross-sectional study (survey-based) was conducted in a fixed time frame after permission from Institutional Ethical Review Board. The pregnant women having age amid 20 years to 40 years were randomly selected from the Outdoor patient department (OPD) of Gynecological and Obstetrics unit of Liaquat University of Medical and Health Sciences, Pakistan. Patients with known comorbidity of diabetes mellitus were excluded. Data were segregated into three groups (trimester wise). The sample size (n) was 123. Random blood glucose level was measured using the U-Check UC-1001 (Munster, Germany). Stress, anxiety and depression were analyzed using a validated questionnaire DASS-21 (Rajaeiramsheh, Rezaie, Davoudi, Ahmadi, & Qorbani-Vanajemi, 2021), have a sensitivity of 78%-89% and specificity of 71%-76% (Beaufort, De Weert-Van Oene, Buwalda, de Leeuw, & Goudriaan, 2017) and the Cronbach's alpha = 0.99 (Coker, Coker, & Sanni, 2018). Before starting the data collection, written consent was taken from the Patients. GraphPad Prism 5 was used for data analysis. Student t-test was employed as appropriate. Data is shown as mean±standard deviation.

## RESULTS

Table.1: Blood Glucose level in normal versus stressed pregnant women (Trimester wise)

Blood Glucose (mg/dl)	Normal	Stress	P-value
First Trimester	107.6 ±18.01	137.82 ±28.94	0.0004
Second Trimester	115.05 ± 18.68	142.60 ±40.34	0.009
Third Trimester	105.53 ±21.56	126.82 ±35.92	0.046

Received on 14-12-2021

Accepted on 15-06-2022

As shown in Table 1 blood glucose level (in the trimester) was observed significantly higher ( $P$ -value: 0.0004, 0.009 and 0.046) in stressed women ( $137.82 \pm 28.94$ ,  $142.60 \pm 40.34$  and  $126.82 \pm 35.92$ ) as compared to normal ( $107.6 \pm 18.01$ ,  $115.05 \pm 18.68$  and  $105.53 \pm 21.56$ ).

Table 2: Blood Glucose level in normal versus depressed pregnant women.

Blood Glucose (mg/dl)	Normal	Depression	P-value
First Trimester	105.62 $\pm$ 13.71	128.62 $\pm$ 29.85	0.043
Second Trimester	112.22 $\pm$ 24.60	136.79 $\pm$ 37.10	0.065
Third Trimester	101.22 $\pm$ 18.66	122.44 $\pm$ 33.41	0.078

As shown in Table 2, blood glucose level was observed higher ( $P$ -values: 0.043, 0.065 and 0.078 in depressed women ( $128.62 \pm 29.85$ ,  $136.79 \pm 37.10$  and  $122.44 \pm 33.41$ ) as compared to normal ( $105.62 \pm 13.71$ ,  $112.22 \pm 24.60$  and  $101.22 \pm 18.66$ ).

Table 3: Blood Glucose level in normal versus anxiety pregnant women (Trimester wise).

Blood Glucose (mg/dl)	Normal	Anxiety	P-Value
First Trimester	107.25 $\pm$ 17.85	125.63 $\pm$ 29.27	0.230
Second Trimester	112.22 $\pm$ 24.61	136.79 $\pm$ 37.10	0.065
Third Trimester	123.66 $\pm$ 37.04	121.81 $\pm$ 32.36	0.900

Table.3 indicates an elevated blood glucose level ( $P$ -value in the first, second and third trimester was 0.230, 0.065 and 0.900 respectively) was measured in those who were suffering from Anxiety ( $125.63 \pm 29.27$ ,  $136.79 \pm 37.10$  and  $121.81 \pm 32.36$ ) as compared to normal ( $107.25 \pm 17.85$ ,  $112.22 \pm 24.61$  and  $123.66 \pm 37.04$ ). However, it is not reaching to a significant level.

## DISCUSSION

In the current study, blood glucose level (in all three trimesters) was observed significantly higher in stressed, depressed and anxious women as compared to normal ones. Interestingly blood glucose level was highest in the second trimester in stress, depression and anxiety women and slightly less (but greater than the first trimester) in the third trimester. The trend of serum blood glucose starts rising in the first trimester, went highest in the second trimester, and then decreased slightly in the third trimester in stressed, depressed and anxious women.

Usually, Pregnancy for women is a stressful condition due to adapting new conditions in their body. For this reason, they suffer stress, anxiety and depression (Nasiri, Akbari, Tagharobi, & Tabatabaee, 2018) and even, in some cases, mental disorders (Smith, Shao, Howell, Lin, & Yonkers, 2011). According to a cohort conducted in Malaysia, those pregnant women who suffer stress or anxiety have threefold chances of being depressed compared to those who don't suffer stress or anxiety (Mohamad Yusuff, Tang, Binns, & Lee, 2015). Hence the current study is persistent with the available literature.

Furthermore, Glucocorticoids are dramatically enhanced during pregnancy to fulfil maternally and fetal energy demands (Wieczorek et al., 2019). In pregnant women, cortisol, the main glucocorticoid, reaches 350ng/ml during the third trimester (Carr, Parker Jr, Madden, MacDonald, & Porter, 1981). moreover, the corticotrophin-releasing hormone (CRH) secreted by the placenta further stimulate glucocorticoid hormone secretion (Douglas, 2005) According to a study conducted on hair cortisol level, a significant upsurge was found in pregnancy-related stress in. First, second and third trimester as well as postpartum depression was also associated with higher cortisol levels (Caparros-Gonzalez et al., 2017). Serum cortisol level was observed significantly higher, while dehydroepiandrosterone sulphate (DEHA-S) level was found lower in women with severe anxiety during the third trimester of pregnancy (Leff-Gelman et al., 2020). Experiencing psychological stress, cortisol is liberated as a biological process (El-Farhan, Rees, & Evans, 2017). Serum cortisol and stress levels are usually enhanced in the third trimester, leading to delivery complications

(Mylonas & Friese, 2015; Rallis, Skouteris, McCabe, & Milgrom, 2014). All the hormonal factors suggest that an upsurge in glucose level is inevitable during pregnancy, and pregnancy-related stress is also apparent. The cross-talk among different glucose maintaining/increasing /secreting hormones and stress could have physiological implications. Understanding the mechanism could benefit maintaining the course of pregnancy and avoiding the complications associated with pregnancy.

## CONCLUSION

An elevated blood glucose level was observed in all three trimesters in stressed, depressed and anxious pregnant women compared to normal ones.

**Recommendations:** Larger sample size with the same pattern will provide more promising findings.

**Acknowledgement:** I want to thank all the medical staff of the LUMHS Gynecology department for their help and support throughout the study. Authors declare no source of funding.

**Declaration of Competing Interest:** The authors state that they have no known competing financial or personal affiliations that may have influenced their work.

**Conflict of interest:** Nil

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