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ANEMIA OF PREGNANCY: A TERTIARY CARE HOSPITAL BASED STUDY ON PREGNANCY SPECIFIC ANXIETY OUTCOMES FROM HYDERABAD, SINDH, PAKISTAN

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ABSTRACT

This study aims to investigate the effects of gestational anemia on adverse outcomes of pregnancy specific anxiety at tertiary care hospitals of Hyderabad. The primary focus of the study is to compare different adverse outcomes related to PSA and gestational anemia among pregnant women.A woman's pregnancy is an essential stage of life, but it also carries a higher risk of various difficulties for both the mother and the fetus. Anemia and Pregnancy specific anxiety among developing nation are most rising complications that people deal among such countries including Pakistan, both Anemia and PSA are assumed to be linked to the majority of pregnancy-related bad outcomes, such as greater rates of acute morbidity and mortality in newborns or mothers, low birth weight, fetal impairment, preterm birth, maternal hemorrhage and preeclampsia. The mother's and the child's life could be in danger as a result of these issues.A descriptive and co relational approach was utilized involving sampling that insured the representation accurse different age groups and socio-economic status. In the present study the data is collected at the "Wards of Department of Gynecology & Obstetrics" of LUH Hyderabad. A total of 362 women in their 3rd trimester with singleton pregnancy age 25-38 years have been investigated in this study. Their blood samples have been taken between 8 am to 11 am. Pregnant women with the condition of essential hypertension, women already on anti-hypertensive therapy, not attended regular antenatal care follow-ups, using anti - depression / anti-psychotic, and those who had endocrinological disorders were excluded.

It is accomplished from the collected data. Mean age of the women was 29.12 +/- 4.96 years. Mean serum Cortisol level (nmol/L) was 431.57 +/- 112.14 (nmol/L). Hamilton anxiety scale was used to assess anxiety score, mean score was 19.06+/-11.14. The maximum ratio of the age group was below 30 years (62%) while women age group above 30 years was (38%). In these 362 patients, 235 pregnant women were found anemic (65%). The patients with mild anemia were 28.5%, moderate anemic ware 23% and severe anemic patient were about 13.5%. Patients having pregnancy specific anxiety were as High as 159 (44%). Pregnancy related feto-meternal complications noted are pregnancy induced hypertension (16%), PPH (9%), LBW (31%), APGAR Score <7 (41%), preeclampsia (20%), preterm (13%) and still birth (3.3%) in overall subjects. When we stratified above complication in four distinct groups, The group having both PSA & GA was estimated to have highest numbers & frequencies of complications such as "pregnancy induced hypertension" 43 (34%), "PPH" 23 (18%), "LBW" 75 (60%), "APGAR Score <7" 105 (83%), "Preeclampsia" 47 (37%), "Preterm" 30 (24%) and still birth 8 (6%).

These findings suggest a substantially significant co relation between adverse outcomes of PSA and gestational anemia and it is concluded that complications related to pregnancy are more prevalent in PWs suffering from both GA and PSA so it is suggested that there is higher risk of wellbeing of both mother and fetus if Anemia and anxiety coexist during third trimester of pregnancy.

KEYWORDS: Pregnancy, Gestational anemia, Pregnancy Specific Anxiety, Adverse outcomes.

INTRODUCTION

The time from conception to labor or abortion is known as pregnancy. This essential time of life needs, a higher metabolism, and a greater amount of vitamins and minerals (Parrettini et al., 2020), requiring twice, thrice and twenty fold more Vitamin B_{12}, Iron and folate respectively (Soma-Pillay et al., 2016). The volume of blood in circulation increases during pregnancy (Chen et al., 2020) resulting in either a low red blood cell mass or increased plasma volume, ultimately causing as low hemoglobin (Hb) concentration i.e. Anemia. (Albarqi, M. N. et al., 2025). World Health Organization conjectures hemoglobin (Hb) < 11 g/dL as gestational anemia (WHO, 2023). Globally prevalence of gestational anemia is 38 % reported by Shah et al., 2022.

The term "pregnancy-specific anxiety" or PSA describes the elevated levels of concern and anxiety that expectant mothers feel for the health and welfare of their unborn child. This particular form of anxiety is unique from ordinary anxiety and is focused on the worries and uncertainties related to pregnancy. (Bedaso et al., 2021). Anxiety triggers the hypothalamic-pituitary-adrenal (HPA) axis, levitation cortisol levels, which intrudes iron absorption and metabolism (Barret & Sullivian, 2024). Iron deficiency can directly disrupt neurotransmitter production which may leads to mood and anxiety. IDA in pregnancy can be postulated to worsen anxiety

indicators, building a cyclical relationship between anemia and anxiety among pregnant women (Thompson et al., 2022). Most pregnancy-related adverse outcomes, including preterm birth, postpartum hemorrhage (PPH), fetal restricted growth (Liu et al., 2022), low birth weight, pre eclampsia, fetal impairment (Hassan et al., 2020) and higher neonatal or maternal acute morbidity and mortality (Guignard et al., 2021). Most studies assess anemia or PSA separately but rarely their combined impact on feto-maternal outcomes. This study is aimed to conclude correlation between PSA and Gestational Anemia and to find out link between different adverse outcomes related to PSA and Gestational Anemia among pregnant patients in Hyderabad, Sindh.

MATERIAL AND METHODS

Study Design & Setting

The "comparative cross sectional study" was undertaken from February 2024 to December 2024, at the Department of Zoology, University of Sindh in collaboration with the Diagnostic and Research Laboratory, and Gynecology and obstetrics department at Liaquat University Hospital, Hyderabad Sindh.

Participants

A total of 362 participants' took part in this study utilizing a "Non- probability Purposive" sampling technique. Inclusion criteria were pregnant women, third trimester with singleton pregnancy, aged 25 to 38 years. Exclusion criteria included twin pregnancy, essential hypertension, women already on anti-hypertensive therapy, using anti -depression / anti-psychotic, and endocrinological disorders.

Data Collection

All participants who met the eligibility criteria had given informed consent without any financial background and had been informed about the study, aim and objectives. Based on inclusion criteria, the patient demographic data, detailed history and clinical examination was performed while the feto-maternal outcomes are noted after delivery by the gynecologist. We categorized study subjects in two groups based on their scores on the Hamilton Anxiety Scale-A. The first group consists of pregnant women with Pregnancy-Specific Anxiety (PSA) and second Group consist of pregnant women without PSA.
Serum Cortisol and Complete Blood Count (CBC) tests were performed after collecting blood samples from each study subject using a fully automated analyzer to estimate hemoglobin levels.

Ethical Consideration

A certificate from the institutional bioethics committee, ORIC/SU/111 was issued through the Office of Research Innovation & Commercialization (ORIC) of University of Sindh, Jamshoro.

Statical Analysis

Data was collated with appropriate coding in Microsoft Excel. Subsequently, data was further analyzed in Statistical Package for Social Sciences for Windows version 25. Frequency and percentage are the mode of analysis for categorical variables. For graphical presentation graphs and pie chart are used. For continuous variable the mode of analysis is mean and SD.

RESULTS AND DISCUSSION

In our study, 362 Pregnant Women (PW) were questioned for the prevalence of Pregnancy Specific Anxiety (PSA). Out of these ladies, 159 mothers were diagnosed to be suffering from Pregnancy Specific Anxiety, while 203 mothers were without Pregnancy Specific Anxiety. This distribution shows that almost 44% of female of district Hyderabad has PSA. 203 of the mothers who study out of 362 do not show any signs of this anxiety i.e. 56%, as shown in Table I. We examined 362 pregnant women (PW) to identify the prevalence of Gestational Anemia (GA) based on blood CBC. 235 women were diagnosed with Gestational anemia whereas only 127 PW had Hemoglobin levels above normal for pregnancy. This suggested that Hyderabad district had a high prevalence of GA as observed of 65%, see Table I.

Table: I Frequencies of Study variables (n=362)

Demographic Variable	Frequency	Percentage
Anxiety Status		
• PW with PSA	159	44%
• PW without PSA	203	56%
Anxiety Status		
• PW with Anemia	235	65%
• PW without Anemia	127	35%

Figure 1 is plotted to enumerate the frequency of Feto-maternal complications observed in our study population (n=362). A total of 362 pregnant women were studied, and the incidence of pregnancy-induced hypertension (PIH) was observed in 57 cases (16% of the total complications), while 32 cases of postpartum hemorrhage (PPH) were noted in 9% of pregnancies in this cohort. Moreover, the incidence of preeclampsia was found in 72 cases (20% of complications); Out of the fetal complications reported, 112 (31%) of the cases had Low Birth Weight (LBW), which is one of the most concerning complications as being associated with higher incidence of neonatal morbidity and mortality rates. 150 neonates had low Apgar scores, estimating 41% of the infants born to all study participants. In this cohort, the high proportion of infants with low Apgar scores highlights the need for interventions to improve neonatal health outcomes. Figure: It also shows that out of the affected, 48 (13%) preterm births were recorded and 12 (3%) stillbirths as well; this helped to determine the risk of pregnancy during our study.

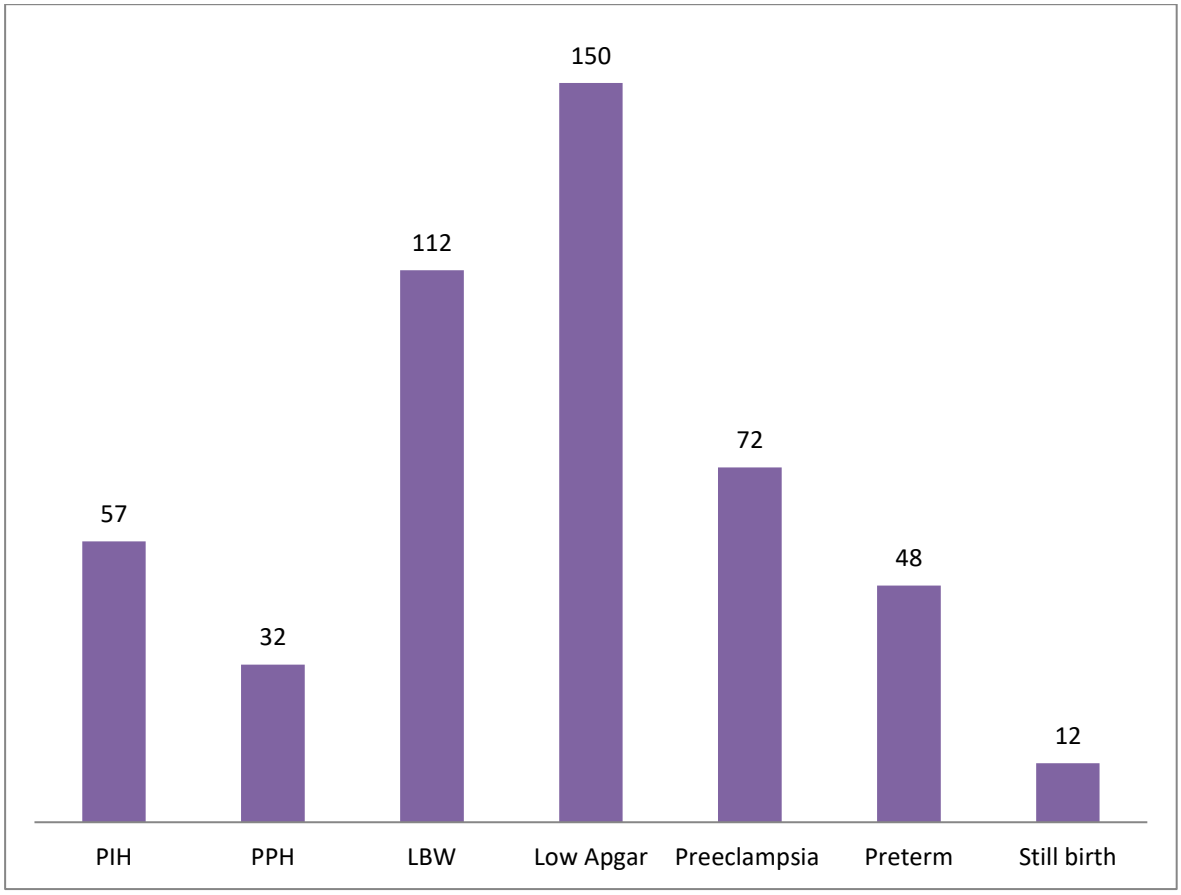

Figure: 1- Feto-maternal complications in study participants (n=362)

Based on our study sample of 362 PW participants, table 2 depicts the association between feto-maternal complications, anemia status, and pregnancy-specific anxiety (PSA). Depending on whether participants had anemia and PSA, they are categorized into four groups for each complication and further analyzed in order to illustrate how these factors interplay to affect maternal and fetal health.

Table: 2- Distribution of Feto-maternal complications among various study groups

Complication	Participants(n)	Pregnant Women Status				Total	p-Value
		Have PSA		Do not have PSA			
		No Anemia	Have Anemia	No Anemia	Have Anemia		
PIH	362	3	43	4	7	57	<0.0001
	100%	9%	34%	4%	6%	16%	
PPH	362	2	23	3	4	32	<0.0001

	100%	6%	18%	3%	4%	9%	
LBW	362	16	75	10	11	112	<0.0001
	100%	48%	60%	11%	10%	31%	
Low Apgar Score	362	21	105	3	21	150	<0.0001
	100%	64%	83%	3%	19%	41%	
Preeclampsia	362	5	47	5	15	72	<0.0001
	100%	15%	37%	5%	14%	20%	
Preterm	362	4	30	5	9	48	0.0002
	100%	12%	24%	5%	8%	13%	
Still birth	362	2	8	0	2	12	0.0391
	100%	6%	6%	0%	2%	3.3%	
Total	362	33	126	94	109	362	
	100%	9%	35%	26%	30%	100%	

Chi-Square test was applied. P-value<0.05 as significant

Pregnancy Induced Hypertension (PIH) was significantly higher in pregnant women with anemia and PSA; 43 of 126 women (34%) presented this complication, when contrasted, only 4 of 94 women without anemia and PSA developed PIH, this shows a significant p-value of <0.0001 which is in favor of relationship of PIH, anemia with PSA. In contrast to our finding, there is highest occurrence of PIH in PWs having both anemia and anxiety, Zafar K et al., 2023 also showed higher PIH in PWs which suffer anemia. Many studies found positive associations between PIH and PSA (Bergink et al., 2015; Blom et al., 2010; Meltzer-Brody et al., 2017).

Table 2 also shows that 32 patients had Postpartum Hemorrhage (PPH), with a high frequency in patients with anemia and PSA (23), while when compared; only 2 of the 94 women without anemia experienced PPH. A p-value <0.0001 demonstrates this is highly significant. This suggests that effective management and treatment of achieved with anemia, and its corresponding mental health through anxiety alleviation strategies, may be important in decreasing the prevalence of PPH. Mansukhani, R., et al. (2023) revealed moderately higher risk of postpartum hemorrhage (PPH) about 6.2-11.2% in pregnant women with moderate to severe anemia. In contrast to our study 11% PW with anemia also had PPH however Feng, N., & Huang, X. (2023) et al., calculated more than 3 fold PSA pregnant women had PPH which is consistent to our study.

112 cases presented with Low Birth Weight (LBW) and a striking 75 women (60%) who were anemic and had PSA were affected compared to 10 women (11%) without anemia or PSA. The p-value (<0.0001) demonstrates a significant association between LBW, anemia and PSA, similarly Nasreen et al. 2010 suggested about 40% PWS with PSA give birth to babies with LBW which is slightly lower than our observation i.e. 57% while Khan, S et al., 2025 enumerated 33.11% incidence of LBW newborns in PWs with GA that is quit a match to our results i.e. 37%.

The analysis identified 150 infants with reduced Apgar scores (105 cases for mothers with both anemia and PSA i.e. 83%. “Only 3 (3%) babies had a low Apgar score born among mothers without these complications. Lower p-level i.e. <0.0001 is a very low p-level observation shows the strong association in contrast Shah et al. (2022) and Anadkat MM et al., 2023 calculated low APGAR score in newborns of PW with GA to be 37% and 39% respectively but Adnan et al., 2018 discovered low APGAR Score about 60% while our obatin results remain between above studies as 53% of newborns born with low APGAR score, additionaly Sun Y-F et al., also predicted higher incidence of Low APGAR Score in newborns if mother had PSA which is homogenous to our verdicts.

Data extracted from table 4.9 showed 48 preterm birth cases, which were common compared to women with anemia and PSA (30 cases or 24%) against 5 (5%) without these conditions. Our p-value of 0.0002 indicates a significant correlation. Grigoriadis et al. 2018 predicted increased Odd ratio for preterm birth if mother faced anxiety as predicted by our detection while Orakzai et al., 2022 calculated 24% anemic PWs gave birth to preterm babies, additionally Naureen S et al., 2024 calculated 27% babies of anemic PWs suffered preterm birth. This shows that both PSA & Anemia have a significant impact on the preterm.

When we recorded data in relation to still birth”. It was noted in 12 cases, interestingly, of the 12 stillbirths, 8 were present in both the anemia and PSA group (6% prevalence). Although the frequencies are low overall, there is a statistically significant p-value of 0.0391. Anxiety and stress has an interlink relationship with still birth, we

enumerated 3 times higher rate of SB if anxiety is present which is consistent to UK study done via Manchester University. In line to our study, Rahman et al., 2020 showed thrice higher rate of SB in anemic mothers, while Daru et al., 2018 reported even greater rate peaking up 5 folds in GA, this towering rate might be due to reduction in placental perfusion leading towards decreased fetal oxygenation (Khezri, R et al., 2025).

CONCLUSION

In conclusion, the present study showed maternal anemia and anxiety are very common in our society especially in central Sindh. We computed an alarming ramification of adverse outcomes of pregnancy if mother suffers from both anemia and anxiety together. There should be routine screening to rule out anemia and anxiety during pregnancy to promote better feto-maternal outcomes. Nutritional supplementation should also be aid with integrated targeted treatment covering anxiety relived among such patients.

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CONFLICT OF INTEREST

The authors have affirmed no any conflict of interest.

REFERENCES

1. Adnan, Z., Nayyar, A., Nayyar, S., & Mehraj, A. (2018). *Feto-maternal outcome in pregnancy with anemia*, 13(2), 57–61.
2. Ahmed, S., Khan, M., & Rahman, A. (2024). The impact of anemia on mental health in pregnancy: A systematic review. *Maternal and Child Health Journal, 28*(2), 112–121. https://doi.org/10.1007/s10995-023-03745-9
3. Albarqi, M. N. (2025, May). The impact of prenatal care on the prevention of neonatal outcomes: A systematic review and meta-analysis of global health interventions. In *Healthcare* (Vol. 13, No. 9, p. 1076). MDPI.
4. Anadkat, M. M., & Goswami, K. D. (2023). A study of fetomaternal outcome in cases of severe anemia in labor at a tertiary care center. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology, 12*(6), 1721–1724. https://doi.org/10.18203/2320-1770.ijrcog20231543
5. Barrett, E. S., Sullivan, A., Workman, T., Zhang, Y., Loftus, C. T., Szpiro, A. A., ... & Bush, N. R. (2024). Sex-specific associations between placental corticotropin releasing hormone and problem behaviors in childhood. *Psychoneuroendocrinology, 163*, 106994.
6. Bedaso, A., Adams, J., Peng, W., & Sibbritt, D. (2021). The association between social support and antenatal depressive and anxiety symptoms among Australian women. *BMC Pregnancy and Childbirth, 21*(1), 708.
7. Bergink, V., Laursen, T. M., Johannsen, B. M., Kushner, S. A., Meltzer-Brody, S., & Munk-Olsen, T. (2015). Pre-eclampsia and first-onset postpartum psychiatric episodes: A Danish population-based cohort study. *Psychological Medicine, 45*, 3481–3489.
8. Blom, E. A., Jansen, P. W., Verhulst, F. C., Hofman, A., Raat, H., Jaddoe, V. W., Coolman, M., Steegers, E. A., & Tiemeier, H. (2010). Perinatal complications increase the risk of postpartum depression: The Generation R Study. *BJOG, 117*, 1390–1398.
9. Chen, M., Zeng, J., Liu, X., Sun, G., Gao, Y., Liao, J., ... & Qi, H. (2020). Changes in physiology and immune system during pregnancy and coronavirus infection: A review. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 255*, 124–128.
10. Feng, N., & Huang, X. (2023). Investigation and analysis of high-risk factors of postpartum hemorrhage in singleton primiparous women: A cross-sectional study, *16*(2), 31–40.
11. Grigoriadis, S., Graves, L., Peer, M., Mamisashvili, L., Tomlinson, G., Vigod, S., Dennis, C.-L., Steiner, M., Brown, C., Cheung, A., Dawson, H., Rector, N., Guenette, M., & Richter, M. (2018). Maternal anxiety during pregnancy and the association with adverse perinatal outcomes: Systematic review and meta-analysis. *The Journal of Clinical Psychiatry, 79*. https://doi.org/10.4088/JCP.17r12011
12. Guignard, J., Deneux-Tharaux, C., Seco, A., Beucher, G., Kayem, G., Bonnet, M. P., ... & Chiesa-Dubruille, C. (2021). Gestational anaemia and severe acute maternal morbidity: A population-based study. *Anaesthesia, 76*(1), 61–71.
13. Hassan, S. I., Gouda, A. M. I., El-Monshed, A., & Kandeel, H. A. M. (2020). Effect of cognitive behavioral therapy on anxiety, stress, depression, and coping pattern among pregnant women with preeclampsia. *American Journal of Nursing Research, 8*(2), 269–277.
14. Khan, S., Baloch, F. N., Bosan, R., Khan, A., Khan, M., Punar, Z. A., & Munaf, Z. (2025). Frequency of low birth weight neonates in mothers with low serum ferritin levels. *Pakistan Journal of Health Sciences, 6*(3), 60–66.
15. Khezri, R., Rezaei, F., Jahanfar, S., et al. (2025). Association between maternal anemia during pregnancy with low birth weight in their infants. *Scientific Reports, 15*, 6446.

16. Li, X., Wang, Y., Zhang, Q., & Liu, J. (2022). Anxiety and adherence to iron supplementation in pregnant women: A cross-sectional study. *BMC Pregnancy and Childbirth, 22*, 343. https://doi.org/10.1186/s12884-022-04642-x
17. Mansukhani, R., et al. (2023). Maternal anaemia and the risk of postpartum haemorrhage: A cohort analysis of data from the WOMAN-2 trial. *The Lancet Global Health, 11*(8), e1249–e1259.
18. Meltzer-Brody, S., Maegbaek, M. L., Medland, S. E., Miller, W. C., Sullivan, P., & Munk-Olsen, T. (2017). Obstetrical, pregnancy and socio-economic predictors for new-onset severe postpartum psychiatric disorders in primiparous women. *Psychological Medicine, 47*, 1427–1441.
19. Naoreen, S., Mahmood, A., Saleem, A., Afridi, H., Kaleem, S., & Zulfi, Q.-ul-A. (2024). Frequency of anemia in women with preterm labour. *Esculapio – JSIMS, 20*(1), 134–137.
20. Nasreen, H. E., Kabir, Z. N., Forsell, Y., et al. (2010). Low birth weight in offspring of women with depressive and anxiety symptoms during pregnancy: A population-based study in Bangladesh. *BMC Public Health, 10*, 515.
21. Orakzai, N. S., Hayat, Z., Hussain, S. I., Bari, A., & Bokhari, N. A. (2022). Frequency of spontaneous preterm birth in anemic mothers, *12*(2).
22. Parrettini, S., Caroli, A., & Torlone, E. (2020). Nutrition and metabolic adaptations in physiological and complicated pregnancy: Focus on obesity and gestational diabetes. *Frontiers in Endocrinology, 11*, 611929.
23. Pavord, S., Daru, J., & Robinson, S. (2022). UK guidelines on iron management in pregnancy. *British Journal of Haematology, 196*(3), 523–536.
24. Rahman, M. M., Shah, R. A., & Yasmin, F. (2020). Maternal health in Pakistan: Challenges and opportunities. *International Journal of Women's Health, 12*, 257–265.
25. Shah, M., Ali, S., & Khan, R. (2022). Factors contributing to pregnancy-specific anxiety in Pakistani women. *Journal of Pregnancy and Childbirth, 8*(4), 123–130.
26. Shah, S. A., et al. (2022). Frequency and risk factors of anxiety and depression among pregnant women in Abbottabad, Pakistan: A facility-based cross-sectional study. *Pakistan Journal of Medical & Health Sciences, 16*(07), 465.
27. Soma-Pillay, P., Nelson-Piercy, C., Tolppanen, H., & Mebazaa, A. (2016). Physiological changes in pregnancy. *Cardiovascular Journal of Africa, 27*(2), 89–94.
28. Sun, Y.-F., Chang, Q., Wu, Q.-J., Gao, S.-Y., Zang, S.-T., Liu, Y.-S., et al. (2021). Association between maternal antenatal depression and neonatal Apgar score: A systematic review and meta-analysis of prospective cohort studies. *Journal of Affective Disorders, 278*, 264–275. https://doi.org/10.1016/j.jad.2020.09.054
29. Thompson, R., Patel, K., & Williams, D. (2022). Iron deficiency anemia and anxiety: A bidirectional relationship in pregnancy. *Psychosomatic Medicine, 84*(5), 543–550. https://doi.org/10.1097/PSY.0000000000001073
30. World Health Organization. (2023). Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: Systematic review and meta-analysis. *The Lancet, 401*(10376), 1025–1034. https://doi.org/10.1016/S0140-6736(23)00396-3
31. Zafar, K., Anam, S., Shahid, A., & Shahid, H. (2023). Association of gestational anemia with pregnancy-induced hypertension. *Pakistan Journal of Health Sciences, 4*(12). https://doi.org/10.54393/pjhs.v4i12.1235