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Original Article

Perinatal Outcomes of High Risk Pregnancies: Experience of a Tertiary Care Hospital

Saima Ghaffar[1*], Shahla Channa[1], Saira Dars[1], Shafia Khan[2], Farah Liaquat[3] and Hanozia Shah[4]

[1]Department of Obstetrics and Gynaecology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, Pakistan
[2]Department of Obstetrics and Gynaecology, Ibn-e-Sina University, Mirpurkhas, Pakistan
[3]Department of Obstetrics and Gynaecology, Baqai Medical University (BMU), Karachi, Pakistan
[4]Bilawal Medical College, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, Pakistan

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***Corresponding Author:**
Saima Ghaffar
Department of Obstetrics and Gynaecology, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, Pakistan
saimaghaffararain@yahoo.co.uk

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ABSTRACT

High Risk Pregnancy (HRP) denotes a condition where the mother, the fetus, or both are predisposed to complications during the gestation period, at birth, or postnatally, which is affected by several factors. **Objective:** To analyze the perinatal outcomes of high-risk pregnancies, focusing on the experience of a tertiary care hospital. **Methods:** A longitudinal study over two years, from October 1, 2020, to December 31, 2022, was conducted on 213 high-risk pregnant women, via purposive sampling, who attended the antenatal clinic Liaquat University Hospital, Hyderabad and Jamshoro. After obtaining informed written consent, interviews were conducted with the participants to collect data about their sociodemographic, obstetric, and gynecological histories. Perinatal outcomes were evaluated on the 8th day post-delivery, during which details concerning maternal and fetal complications in terms of morbidity and mortality, were documented. **Results:** Rh-negative pregnancy was found to be the most high-risk factor with 24.4% (52) of the cases, followed by teenage pregnancy at 12.2% (26), and short stature at 10.9% (23). Additionally, severe anemia was found in 21 women (9.8%), Pregnancy Induced Hypertension (PIH) in 18 women (8.6%), and obesity was also seen in 18 women (8.6%). Other noted risk factors included grand multigravida in 13 women (6.1%), thyroid disorder 4.9% (10), twin pregnancy 3.7% (8) and congenital fetal anomaly, polyhydramnios, oligohydramnios each with 2.4% (5). **Conclusions:** This study significantly contributes to the body of knowledge on high-risk pregnancies and their outcomes.

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INTRODUCTION

High-risk pregnancy (HRP) denotes a condition where the mother, the fetus, or both are predisposed to complications during the gestation period, at birth, or postnatally. Factors such as maternal age, pre-existing medical conditions, multiple pregnancies, and issues identified during pregnancy often contribute to a high-risk categorization [1, 2]. Developing nations, including Pakistan, encounter exacerbated challenges pertaining to the management and outcomes of high-risk pregnancies due to limited healthcare resources, lack of accessibility to quality healthcare, and socioeconomic disparities [3]. According to the most recent estimates, the Maternal Mortality Ratio (MMR) in Pakistan is 186 deaths per 100,000 live births [4] , Annually, Pakistan witnesses over five million women embarking on the journey of pregnancy. Among these, a significant proportion are likely to undergo obstetrical and medical complications. These complications, in turn, contribute to a substantial burden of maternal and perinatal morbidity and mortality [5], though significant regional variations exist. Previous estimates from 2009 suggested a higher ratio of 276 per 100,000, highlighting progress in maternal health over the past decade. Hyderabad, a city with both urban and rural areas, faces many healthcare challenges like the rest of

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Pakistan. A significant concern is the limited availability of comprehensive data and systematic strategies to manage high-risk pregnancies [6]. This makes it hard for doctors and families to know what to do. A lot of babies in Hyderabad are born too early, with 21.64% being born prematurely [7]. This shows that we need to do more to help these babies and their mothers. Also, the number of babies who are born dead has gone up from 3.98% to 5.75% over five years [8]. This shows that it's really important to have better plans and data to deal with high-risk pregnancies. Pakistan's tertiary care hospitals face complex medical, social, and economic challenges in managing high-risk pregnancies [9]. By looking at what happens to babies and mothers in these situations, we can learn a lot that can help make policies and practices better, so that pregnancies and births are safer in Pakistan.

Despite the high burden of high-risk pregnancies in Pakistan, evidence from tertiary care settings remains limited by methodological weaknesses such as convenience sampling, lack of a comparison group, unclear operational definitions, and unadjusted analyses, leaving a clear research gap. This study addresses the problem of adverse perinatal outcomes among high-risk pregnant women attending tertiary care hospitals in Hyderabad and Jamshoro, where robust local data are lacking. It aims to determine the prevalence and types of high-risk factors, evaluate associated adverse perinatal outcomes, and identify associations between specific maternal risk factors and outcomes. The findings may inform improved antenatal care strategies and policy for high-risk pregnancies in resource-limited settings.

METHODS

This longitudinal study was conducted over two years (October 2020 to December 2022) at the antenatal clinics of Liaquat University Hospital, Hyderabad and Jamshoro, Pakistan, involving 213 high-risk pregnant women aged 15-45 years recruited via convenience sampling from those attending the antenatal clinics. The study received ethical approval from the Institutional Ethical Review Committee (REC/167) and written informed consent from all participants, with confidentiality maintained throughout. Inclusion criteria required the presence of at least one current or past high-risk factor, with specific operational definitions established a priori: severe anemia (hemoglobin <7 g/dL), pregnancy-induced hypertension (systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg on two separate occasions), teenage pregnancy (<19 years), short stature (<145 cm), obesity (BMI ≥30 kg/m^2), Rh-negative status, and grand multigravida (parity ≥5). Additional risk factors included previous history of miscarriage, previous cesarean section, multiple pregnancy, and any other condition deemed high-risk by the attending physician, while exclusion criteria included incomplete antenatal follow-up until delivery or declined informed consent. The sample size was calculated using the formula for estimating proportions in a finite population, $n = Z^2 \times p \times (1-p) / d^2$, where Z = 1.96 (95% confidence level), p = 0.20 (estimated prevalence of adverse perinatal outcomes in high-risk pregnancies, derived from a previous study in a similar Pakistani population where low birth weight was reported in 22.6% of high-risk pregnancies), and d = 0.05 [10]. Data were collected using a structured, pre-tested questionnaire developed in English and translated into Urdu and Sindhi, piloted on 20 women for clarity, and content-validated by three senior obstetricians. Four trained research assistants with nursing or medical backgrounds underwent a 2-day training program on study objectives, questionnaire administration, ethical conduct, and data recording, achieving strong inter-rater reliability (Cohen's kappa >0.80) assessed through 10 mock interviews. After obtaining written informed consent, face-to-face interviews were conducted to collect sociodemographic, obstetric, and medical history data; all entries were double-entered by two independent assistants with discrepancies resolved against original sheets, and weekly data audits ensured accuracy. Of the 250 women initially approached, 213 (85.2%) completed follow-up, with 37 lost to transfer, withdrawal, or attrition. Current risk factors were identified prospectively during antenatal visits, while past obstetric risks were determined retrospectively through detailed history-taking. Monthly visits (at 4-week intervals) involved standardized clinical assessments including blood pressure measurement using a calibrated mercury sphygmomanometer, weight and BMI calculation, urine protein analysis, complete blood count for hemoglobin, blood group and Rh typing, thyroid function tests when clinically indicated, and obstetric ultrasound performed by qualified radiologists for fetal evaluation, with participants scheduled for 5–8 visits depending on gestational age at enrollment.

Perinatal outcomes were assessed on the 8th day post-delivery, selected per the hospital's routine postnatal discharge protocol and to capture early neonatal complications such as respiratory distress, jaundice, and sepsis, as well as early neonatal deaths which are most common in the first week of life. An attending obstetrician blinded to participants' antenatal risk status evaluated outcomes by reviewing newborn medical records for birth weight, gestational age, Apgar scores, NICU admission, complications, and neonatal mortality, while maternal outcomes included mode of delivery and postpartum hemorrhage; all data were extracted by two independent collectors using standardized forms to minimize errors.

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Statistical analysis was performed using SPSS version 21.0, with descriptive statistics summarizing baseline characteristics as frequencies, percentages, and means with standard deviations. Univariate analysis using the Chi-square test (or Fisher's exact test where expected cell counts were <5) evaluated associations between individual risk factors and adverse fetal outcomes, with $p<0.05$ considered significant and odds ratios reported with 95% confidence intervals. Although multivariate logistic regression was planned to adjust for potential confounders such as maternal age, parity, and socioeconomic status, it could not be reliably performed due to the limited sample size (n=213) and the occurrence of only 43 adverse events, falling below the recommended minimum of 10 events per predictor variable.

RESULTS

The study included 213 high-risk pregnant women, with a mean age of 26.7 ± 5.4 years, and most participants were aged 20–29 years (58.2%). A substantial proportion had no formal education (41.8%), while 61.5% were from urban areas. Nearly half of the participants belonged to the low socioeconomic group (45.5%). Regarding parity, 46.0% had 1–2 previous births, while 6.1% were grand multigravida (parity ≥5).

Table 1: Demographic Characteristics of Study Participants

Characteristics	Frequency (%)
Age (years)	
<19 (Teenage)	26 (12.2%)
20-29	124 (58.2%)
30-39	60 (28.2%)
≥40	3 (1.4%)
Mean age ± SD	26.7 ± 5.4 years
Education	
No formal education	89 (41.8%)
Primary	52 (24.4%)
Secondary	48 (22.5%)
Higher secondary or above	24 (11.3%)
Residence	
Urban	131 (61.5%)
Rural	82 (38.5%)
Socioeconomic Status	
Low	97 (45.5%)
Middle	84 (39.4%)
High	32 (15.1%)
Parity	46 (21.6%)
Primigravida	
1-2	98 (46.0%)
3-4	56 (26.3%)
≥5 (Grand multigravida)	13 (6.1%)

The study on high-risk pregnancies among 213 expectant mothers unveiled various risk factors prevalent in the current pregnancy, as well as past pregnancies. The exploration of high-risk factors during the current pregnancy revealed that Rh-negative pregnancy topped the list with 24.4% (52) of the cases, followed by teenage pregnancy at 12.2% (26) and short stature at 10.9% (23). Additionally, severe anemia (defined as hemoglobin <7 g/dL) was found in 21 women (9.8%), Pregnancy Induced Hypertension (PIH; defined as systolic BP ≥140 mmHg and/or diastolic BP ≥90 mmHg on two separate occasions at least 4 hours apart) in 18 women (8.6%), and obesity (defined as BMI ≥30 kg/m^2) was also seen in 18 women (8.6%). Other risk factors were defined as follows: teenage pregnancy (age <19 years), short stature (height <145 cm), and grand multigravida (parity ≥5). Other noted risk factors included grand multigravida in 13 women (6.1%), thyroid disorder 4.9% (10), twin pregnancy 3.7% (8) and congenital fetal anomaly, polyhydramnios, oligohydramnios each with 2.4% (5). The least common factors were breeching presentation, antepartum hemorrhage, and elderly primigravida each accounting for 1.2% (3) of the sample size (Table 2).

Table 2: Type of High-Risk Pregnancy (Current Pregnancy)

Characteristics	Frequency (%)
Maternal Age Factors	
Elderly Primigravida	3 (1.2%)
Teenage Pregnancy	26 (12.2%)
Physiological Factors	
Severe Anemia	21 (9.8%)
Pregnancy Induced Hypertension	18 (8.6%)
Rh-Negative Pregnancy	52 (24.4%)
Obesity	18 (8.6%)
Thyroid Problems	10 (4.9%)
Reproductive Factors	
Pregnancy with Twin	8 (3.7%)
Grand Multigravida	13 (6.1%)
Pregnancy Complications	
Short Stature	23 (10.9%)
Polyhydramnios	5 (2.4%)
Oligohydramnios	5 (2.4%)
Congenital Fetal Anomaly	5 (2.4%)
Abnormal Fetal Presentation	3 (1.2%)
Antepartum Hemorrhage	3 (1.2%)
Total	213 (100%)

When delving into the past pregnancy high-risk factors among the participants, the most common were previous caesarean with 29.4% (63), previous history of abortion with 24.5% (52), and previous history of neonatal or child death with 21.6% (46). Further, renal disorders, previous gynecological surgery, and Previous Pregnancy Induced Hypertension each were found in 2.9% (6) of the cases. The least common were known case of hyperthyroidism, heart disease, history of Sexual Transmitted Infection, previous

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twin pregnancy, previous malpresentation, thalassemia, lung disease, allergic illness, previous postpartum hemorrhage, and previous premature rupture of membrane each with less than 4% cases (Table 3).

Table 3: Type of Previous Pregnancies with increased risk

Characteristics	Frequency (%)
Past Reproductive History	
Past History of Caesarean	63 (29.4%)
Past History of Abortion	52 (24.5%)
Past History of Miscarriage or Fetal Death	46 (21.6%)
Past History of Gynecological Surgery	6 (2.9%)
Past History of Pregnancy -Induced Hypertension	6 (2.9%)
Presence of Hypothyroidism	6 (2.9%)
Presence of Hyperthyroidism	2 (0.9%)
Past History of Fetal Congenital Anomaly	4 (1.9%)
Past History of PPH	2 (0.9%)
Past History of PROM	2 (0.9%)
Past History of Pregnancy with Twins	2 (0.9%)
Past History of Abnormal Presentation	2 (0.9%)
Pre-Existing Medical Condition	
Renal Disorder	8 (3.9%)
Heart Disease	2 (0.9%)
H/o Sexual Transmitted Infection	2 (0.9%)
Thalassemia	2 (0.9%)
Lung disease	2 (0.9%)
Allergic Illness	2 (0.9%)
Total	213 (100%)

The evaluation of adverse fetal outcomes from the study presented a variety of challenges faced during the term of pregnancy. Of the 213 pregnancies, 39 women (18.3%) experienced at least one adverse fetal outcome. A total of 43 adverse outcomes were recorded among these 39 women, as some women experienced multiple complications (e.g., low birth weight and NICU admission), and preterm birth in 6 cases (14.0%). Early neonatal death and abortion each were observed in 9.3% (4), similar to still birth and Intrauterine Death (IUD). Twins preterm was reported in 5 cases, accounting for 11.6% of the adverse outcomes. Of the 213 pregnancies, 39 women (18.3%) experienced at least one adverse fetal outcome. A total of 43 adverse outcomes were recorded among these 39 women, as some women experienced multiple complications (e.g., low birth weight and NICU admission). Univariate analysis revealed that teenage pregnancy (OR: 3.2, 95% CI: 1.4-7.2, p=0.005) and severe anemia (OR: 2.8, 95% CI: 1.1-6.9, p=0.02) were significantly associated with adverse fetal outcomes, indicating more than a three-fold and nearly three-fold increased risk, respectively. Although Rh-negative status, PIH, and short stature showed elevated odds ratios (ranging from 1.9 to 2.3), these associations did not reach statistical significance (p>0.05). Obesity, grand multigravida, and previous cesarean section showed no significant associations, with odds ratios close to or below 1.0 (Table 4).

Table 4: Association Between Risk Factors and Adverse Fetal Outcomes

Risk Factor	Adverse Outcome (n=39)	No Adverse Outcome (n=174)	p-value	OR (95% CI)
Teenage Pregnancy (n=26)	10 (38.5%)	16 (61.5%)	0.05*	3.2 (1.4-7.2)
Rh-Negative (n=52)	14 (26.9%)	38 (73.1%)	0.08	1.9 (0.9-3.9)
Severe Anemia (n=21)	8 (38.1%)	13 (61.9%)	0.02*	2.8 (1.1-6.9)
PIH (n=18)	6 (33.3%)	12 (66.7%)	0.07	2.3 (0.8-6.2)
Short Stature (n=23)	7 (30.4%)	16 (69.6%)	0.08	2.0 (0.8-5.1)
Obesity (n=18)	4 (22.2%)	14 (77.8%)	0.47	1.3 (0.4-4.1)
Grand Multigravida (n=13)	3 (23.1%)	10 (76.9%)	0.42	1.5 (0.4-5.5)
Previous C-Section (n=63)	8 (12.7%)	55 (87.3%)	0.13	0.5 (0.2-1.2)

Among women who experienced adverse fetal outcomes, teenage pregnancy had the highest proportion of affected individuals within its category (38.5%), followed closely by severe anemia (38.1%), indicating these conditions carried the greatest individual risk burden. PIH (33.3%) and short stature (30.4%) also demonstrated substantial proportions of adverse outcomes, while Rh-negative status showed a relatively lower within-category proportion (26.9%). The "others/combined" category had the lowest proportion (19.2%), suggesting that multiple or less-specific risk factors collectively posed a lower per-individual risk compared to the primary high-risk conditions (Table 5).

Table 5: Adverse Fetal Outcomes by Specific Risk Factor Categories

Risk Factor Category	Adverse Outcomes (%)	Total N	% of Category with Adverse Outcome
Rh-Negative	14 (32.6%)	52	26.9%
Teenage Pregnancy	10 (23.3%)	26	38.5%
Severe Anemia	8 (18.6%)	21	38.1%
Short Stature	7 (16.3%)	23	30.4%
PIH	6 (14.0%)	18	33.3%
Others/Combined	14 (32.6%)	73	19.2%

DISCUSSION

The results of this study provide a glimpse into the multifaceted challenges encountered in managing high-risk pregnancies, and it's evident that the circumstances surrounding such pregnancies are complex and require multifaceted interventions. The prevalence of Rh-negative pregnancy, teenage pregnancy, and short stature as significant risk factors in the current pregnancy is consistent with literature from other regions. A study in Iran showed a significant correlation between maternal age, particularly teenage pregnancy, and adverse pregnancy outcomes, underscoring the global challenge posed by teenage pregnancies [10]. The finding on severe anemia resonates with a study conducted in Nigeria, which highlighted the impact of severe anemia on maternal and

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fetal outcomes, emphasizing the importance of early detection and management [11]. Similarly, Pregnancy-Induced Hypertension (PIH) has been a recurring theme in many studies as a significant high-risk factor. A study from Nepal affirmed the association between PIH and adverse perinatal outcomes [12]. The scenario of past pregnancy high-risk factors such as previous caesarean, history of abortion, and neonatal or child death mirrors the findings from a study in Bangladesh which showed that a history of cesarean section significantly increased the likelihood of adverse pregnancy outcomes [13]. A study published in the American Journal of Obstetrics and Gynecology, reported a history of abortion as a probable linked to preterm birth in succeeding pregnancies [14]. When we talk about problems with babies being born, like low birth weight, needing special care in the NICU, and being born too early, it's happening a lot around the world. A study in Taiwan showed that when babies are born too early or too small, they're more likely to have health problems and even die soon after birth [15]. Babies dying soon after birth, having abortions, and being stillborn in this study show that we need to look more closely at the quality and accessibility of antenatal care for pregnant women [16, 17].High-risk pregnancies, where there's a greater chance of something going wrong, are a big problem all over the world. The problems we saw in this study with babies are part of bigger challenges in taking care of pregnant women and babies. We already know it's important to find out early if a pregnancy is high-risk and to take care of it right. A study in Ethiopia showed that getting care early in pregnancy can make a big difference in how well the pregnancy goes, especially if it's high-risk [18]. Taking care of high-risk pregnancies doesn't stop when the baby is born. The findings of this study should be interpreted with caution when generalizing to other populations. The study was conducted at two tertiary care hospitals in Hyderabad and Jamshoro, Pakistan, which serve predominantly urban and peri-urban populations. Women attending these facilities may have different risk profiles, healthcare access, and socioeconomic characteristics compared to those in rural areas or primary care settings. Additionally, the relatively small sample size and convenience sampling method limit the generalizability of the findings. The results are most applicable to high-risk pregnant women attending tertiary care hospitals in similar urban settings in South Asia. Future multicenter studies involving diverse settings(rural, primary, and secondary care) are needed to confirm the generalizability of these findings. A study in the UK emphasized the importance of continued maternal support and monitoring in the postpartum period, particularly for women at risk of future high-risk pregnancies [19] . Similarly, studies from China have identified obesity as a prevalent risk factor in pregnancy, while thyroid disorders have also been increasingly recognized as important contributors to adverse pregnancy outcomes [20]. But in poorer countries severe anemia is more common because people don't get enough of the right food [21].

This study has several limitations that should be acknowledged. First, the use of convenience sampling may have introduced selection bias, as participants were recruited from a single tertiary care hospital, which may not be representative of all high-risk pregnant women in Pakistan, particularly those in rural or primary care settings. Second, the relatively small sample size (n=213) limited our ability to perform multivariate analysis to control for potential confounders. Third, the lack of a comparison group of low-risk pregnancies prevented us from calculating relative risks or determining whether adverse outcomes were more common in high-risk pregnancies. Fourth, some data, particularly regarding past obstetric history, were collected retrospectively and may be subject to recall bias. Fifth, outcomes were assessed at 8 days postpartum, which does not capture long-term neonatal or maternal outcomes. Finally, we did not assess maternal outcomes such as maternal mortality, morbidity, or mode of delivery, which limits the comprehensiveness of our perinatal outcome assessment. This study included only high-risk pregnant women and did not include a comparison group of low-risk pregnancies. As a result, we were unable to determine whether the observed adverse outcomes were significantly more common in high-risk pregnancies compared to low-risk pregnancies. A significant limitation of this study is the absence of a comparison group of low-risk pregnancies. Without such a comparison, we cannot calculate relative risks or determine whether the adverse outcomes observed are attributable to the high-risk status itself or would have occurred at similar rates in a low-risk population. Future studies should include a control group of low-risk pregnancies to allow for calculation of relative risks and to better understand the independent contribution of specific risk factors to adverse perinatal outcomes. The lack of a comparison group means that our findings should be interpreted as prevalence estimates within this high-risk population, rather than as evidence of increased risk associated with specific factors. Future studies should include a control group of low-risk pregnancies to allow for calculation of relative risks and to better understand the independent contribution of specific risk factors to adverse perinatal outcomes.

CONCLUSIONS

This study adds important information to what we already know about high-risk pregnancies and what happens to the babies. But we still need more research to understand

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better why these problems happen and how we can find them early, treat them, and stop them from happening in the first place. This will help make things better for moms and babies all over the world.

Authors Contribution

Conceptualization: SG,
Methodology: SC, SD, FL, HS
Formal analysis: SG
Writing-review and editing: SG, SC, SD, FL, HS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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