

Original Article

INTRAUTERINE GROWTH RESTRICTION IN PREGNANCY-INDUCED HYPERTENSION: INCIDENCE AND ASSOCIATED FACTORS IN A TERTIARY CARE SETTING OF KHYBER PAKHTUNKHWA, PAKISTAN

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Background: Pregnancy-induced hypertension (PIH) is one of the leading risk factors, commencing greater foetal and maternal morbidity and mortality worldwide. Among other complications, intrauterine growth restriction (IUGR) is a significant outcome of PIH. In the Pakistani context, the incidence of IUGR in PIH women and comparison with human factors is rarely determined. This study aimed to find the frequencies of IUGR among PIH women presenting to a tertiary care setup and determine the possible effect of age, gestational age, parity, and weight on IUGR. **Methods:** This cross-sectional study was conducted from 1st March to 30th August 2023 at the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital, Abbottabad. The research comprised 159 pregnant women who had hypertension problems. The researcher underlined that all women underwent ultrasound biometry to determine IUGR per the Royal College of Obstetricians and Gynaecologists criteria. **Results:** Among the total 159 PIH women with a mean age of 27.691±2.63 years, the incidence of IUGR is 10.7%. IUGR was more prevalent in the 31–40 age group, i.e., 13%, having gestational age more than 30 weeks, i.e. 16%, parity, i.e. 9.8%, and weight more than 70kg, i.e. 45.7%. **Conclusion:** The incidence of IUGR among women with PIH is low compared to neighbouring developing countries and requires individualised perinatal care, particularly among older aged, overweight, nulliparous, and beyond 30 weeks of gestation on a priority basis.

Keywords: pregnancy-induced hypertension; intrauterine growth restriction; gestational age; parity, weight

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INTRODUCTION

Pregnancy-induced hypertension (PIH) is a condition in which a pregnant woman beyond the 20th week of gestation has high blood pressure ($\geq 140/90$ mmHg).¹ Along with eclampsia and pre-eclampsia, PIH is an alarming concern of public health worldwide that affects a significant population of pregnant women.² It bears a threatening risk to the foetus and mother, putting them at increased risk of other conditions like premature delivery, intrauterine growth restriction (IUGR), and placental abruption.³ IUGR refers to the condition of achieving a low birth weight of a fetus by 10 percentile for gestational age.⁴ It further devastated the pregnancy by 0.4%, increasing the overall morbidity and mortality rate and putting the neonates at high risk of poor neurodevelopmental and extrauterine growth restriction after pre-term birth.^{5,6} The association of PIH and IUGR has diverse presentations. However, as a serious complication of pregnancy, IUGR increases the

perinatal morbidity and mortality of mothers and foetuses.

The incidence of IUGR pregnancies complicated by PIH women varies. In the local context, Jabeen SS *et al*, reported 56.5% of PIH among 170 pregnant women, even more in nulliparous and IUGR in 64.7% of babies.⁷ Globally, the prevalence of IUGR ranges from 7 to 15% and more in developing countries, i.e., 30%.^{8,9} Zafar H *et al*, found 28%, and Fox NS *et al*, reported a 48.8% frequency of IUGR in pregnant women with PIH.^{10,11} Some studies indicate a move strong link between IUGR and pre-eclampsia and haemolysis, elevated liver enzymes, and low platelet count (HELLP) syndrome.¹² Other studies highlight the demographic effect of PIH on IUGR. Jabeen SS *et al*, from Iran, correlated IUGR with gestational age, type of parity, and mode of delivery.⁷

This variability accentuates the need for further exploration to understand the possible significance of one condition affecting IUGR in PIH

pregnant women. Hence, this study aimed to find the frequencies of IUGR in the high-risk group, such as PIH presenting a tertiary care setting in Khyber Pakhtunkhwa, and determine the possible effect of age, gestational age, parity, and weight on IUGR. The study will not only help early preventive intervention in such high-risk groups but also will result in reducing maternal and neonatal morbidity and mortality.

MATERIAL AND METHODS

This cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Ayub Teaching Hospital, Abbottabad, from 1st March to 30th August 2023. The sample size of 159 was calculated with the expected proportion (intrauterine growth restriction) of 28% and absolute precision (d) of 7%⁸ using the WHO calculator. The study protocol was approved by the institution's ethical review board (Approval no: B-14, dated 02-01-2023). Data was collected after obtaining written consent through consecutive sampling techniques. Women aged 18–40 years, having singleton pregnancies on ultrasound with Parity 0–4, gestational age >20 weeks, and PIH as per consultant diagnosis were included in the study. Based on Royal College of Obstetricians and Gynaecologists guidelines, a senior Obstetrician and, sometimes, a radiologist confirmed IUGR in complicated cases. Moreover, noted by the researcher herself on the specially designed proforma, those patients with chronic hypertension on history, ruptured membranes on ultrasound, history of systemic diseases (renal, respiratory, congenital heart disease) on medical record, and congenital anomalies on ultrasound were excluded.

Data was analysed with SPSS version 22. Frequency and percentage were computed for qualitative variables like age groups, PIH, pre-eclampsia, and IUGR. Mean±SD was presented for quantitative variables like age, gestational age, parity, and weight. The Chi-square test was applied to find significant differences in IUGR and age, gestational age, parity, and weight. $p \leq 0.05$ was considered statistically significant.

RESULTS

A total of 159 PIH women with a mean age of 27.7 ± 2.63 years, ranging from 18–40 years, were studied. The mean gestational age was 28.6 ± 2.19 weeks, parity was 0.817 ± 1.04 , and weight was 63.993 ± 7.44 Kg, as shown in Table-1.

The majority of the patients, i.e., 130(81.8%), were from the age group of 18–30 years, and 29(18.2%) patients were of 31–40 age group, as shown in Table-2. IUGR was seen in 17(10.7%) of patients, as shown in Figure-1. Stratification of IUGR with respect to age, gestational age, parity, and weight is shown in Table-3.

Table-1: Demographic variables of patients, n=159

Demographics	Mean±SD
Age (years)	27.691±2.63
Gestational age (weeks)	28.553±2.19
Parity	0.817±1.04
Weight (Kg)	63.993±7.44

Table-2: Frequency of patients according to age group, n=159

Age group (years)	No of Patients	Percentage
18–30	130	81.8
31–40	29	18.2

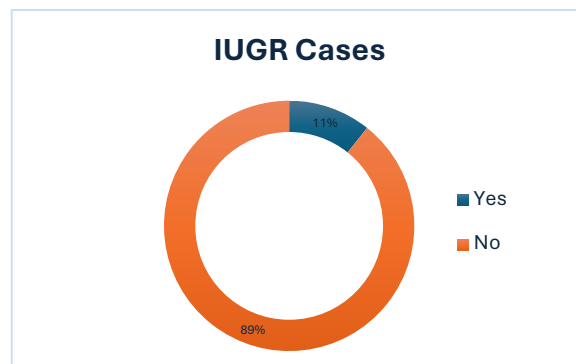


Figure 1: Percentage and frequency of patients according to IUGR, n=159

Table-3: Stratification of IUGR with respect to age, gestational age, parity and weight, n=159

	IUGR n (%)			<i>p</i>
	Yes	No	Total	
Age (years)				
18–30	13 (10)	117 (90)	130 (81.8)	0.550
31–40	4 (13.8)	25 (86.2)	29 (18.2)	
Gestational age (weeks)				
21–30	13 (9.7)	121 (90.3)	134 (84.3)	0.349
>30	4 (16.0)	21 (84)	25 (15.7)	
Parity				
0–2	14 (9.8)	129 (90.2)	143 (89.9)	0.271
3–4	3 (18.8)	13 (81.2)	16 (10.1)	
Weight (Kg)				
≤70	3 (2.3)	126 (97.7)	129 (81.1)	0.000
>70	14 (46.7)	16 (53.3)	30 (18.9)	
Total	17 (10.7)	142 (89.3)	159 (100)	

$p < 0.05$

DISCUSSION

PIH is one of the leading risks for increased foetal and maternal morbidity, particularly in developing countries.¹³ IUGR is considered one of the complications of PIH. It is essential to know its incidence in Pakistan. This study revealed a total of 10.7% incidence of IUGR in PIH patients presented to Ayub Teaching Hospital, Abbottabad, along with its comparison with age, gestational age, weight, and parity.

The incidence of IUGR among PIH patients varies locally and worldwide. As per Majeed S *et al*, conducted in Pakistan, it is 25.56%, which is higher compared to our findings, i.e. 10.7%.¹⁴ Jabeen SS *et al*,

from Iran, found a quite high incidence of IUGR in PIH patients, 56.5%, which is much higher than ours.⁶ Moreover, Zafar H *et al.*, and Fox NS *et al.*, showed 28% and 48.8%, respectively.^{10,11} To the best of our knowledge, only one study from Indonesia revealed a 4.4% prevalence of IUGR, which can be considered close to our result. The same study indicated that PIH cases have 1.72 times the chance of IUGR.¹⁵ This indicates a substantial variation in the incidence of IUGR globally, with a range of 4.4 to 56.5%.

In our cohort, the mean maternal age was 27.691±2.63 years, with the majority in the younger age group, i.e., 81.8%. In contrast, the incidence of IUGR was higher in the late age group, i.e., 13.8%. This is in contrast to a study by Jabeen SS *et al.*, where 66% of IUGR cases were found in early age groups.⁷ Majeed S *et al.*, reported that most cases of IUGR were found in the late age group (36–40 years), i.e., 38.9%, which supports our findings.¹⁴ Likewise, the IUGR occurrence in PIH at different age groups is highly variable. Nevertheless, more cases of IUGR are expected among the elderly pregnant cohort with PIH. This can possibly be due to the physiological changes in reproductive organs, particularly the placental function, which compromises foetal growth.

The mean gestational age of our cohort was 28.553±2.19 weeks, having more cases of IUGR, i.e., 16% beyond 30 weeks of gestation. Jabeen SS *et al.*, had 65.2% of IUGR cases among 31 or above the gestational age group.⁷ In contrast, Majeed S *et al.*, had more cases of IUGR, 28.8% below 28 weeks of gestation and 24.5% above 30 weeks.¹⁴ Whatever, the literature supports more incidence of IUGR cases in PIH pregnant women starting late in the gestational period. This can be due to the exacerbation of placental insufficiency due to PIH and the increase in intrauterine foetus growth. The obstetricians need to be more vigilant beyond the 30th week of gestation with women having PIH.

Parity, another risk factor of IUGR, was also studied in this cohort, suggesting 14 nullipara women had IUGR compared to 3 multipara women without IUGR. In other studies like, Majeed S *et al.*, had 27.2% IUGR cases with first and second parity, Febrina NAD *et al.*, had 50% IUGR cases in primipara irrespective of PIH, and Jabeen SS *et al.*, had 63.1% IUGR with nulliparous in PIH cases.^{7,14,15} These indicate that multiparity is a contributing risk factor for IUGR. Growth limits may result from impaired uteroplacental circulation caused by the accumulated physiological demands of several pregnancies.¹⁶

Women weighing more than 70 kg is another critical determinant of IUGR. The current study resulted in 46.7% of samples appearing above 70kg. This highlights the complexity of obesity, rendering proper growth of the fetus simultaneously.¹⁷ Although low maternal weight is a recognised risk factor for IUGR, our results show that being overweight may also have

adverse effects, potentially via mechanisms such as worsening of hypertensive diseases and endothelial dysfunction.¹⁸

Due to time constraints, the author could not include other potential risks like obesity, diabetes, anaemia, pre-eclampsia, and some demographic variables, and therefore, it is strongly suggested to include these factors and find any association with IUGR. Although properly calculated, the sample size of the current study needs to be explored with a large cohort so that a generalizable projection of the pregnant women population can be drawn and presented to the local community.

CONCLUSION

The incidence of IUGR among women with PIH is low compared to neighbouring developing countries. This study's findings emphasise the significance of individualised perinatal monitoring, particularly among older, overweight, nulliparous, and beyond 30 weeks of gestation, on a priority basis.

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