ORIGINAL ARTICLE

Frequency and outcome of Intrauterine Growth Restriction (IUGR) in pregnancy induced hypertension

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Abstract

Introduction: Intrauterine growth restriction (IUGR) has been demonstrated to have serious consequences for health in adult age. Pregnancy induced hypertension is closely related with placental dysfunction that result in fetal growth restriction. The study was to determine the frequency and outcome of intrauterine growth restriction (IUGR) in pregnancy induced hypertension.

Material and Methods: This cross-sectional study was conducted from 1st June 2021 to 31st December 2021, involving 160 pregnant women presenting at the Jinnah Medical College Hospital, Karachi. All the pregnant ladies of 15-45 years of age either nulliparous or multiparous had pregnancy induced hypertension after 20 weeks of gestation were recruited for the study. All the subjects with PIH were observed for IUGR and outcome according to the parameters mentioned in operational definition. The clinical maneuvers (history and clinical examination) were performed by researcher while the ultrasound was performed by sonologist. The data was collected on pre-designed proforma. The data was analyzed in SPSS version 16.00.

Results:During 6-months study period total 160 pregnancy induced hypertension were observed for intrauterine growth restriction (IUGR). The mean ±SD for maternal age (years), gestational age (weeks), duration of disease (weeks), baby weight (grams) and apgar score for overall population was 38.95±8.92, 33.73±6.92, 3.00±2.0, 4.91±1.52, 1811±3.32 and 4.21±1.21. The IUGR was detected in 104(65%) babies while the outcome identified as low apgar score 28(26.9%), abortion 13 (12.5%), low birth weight 28 (26.9%), pre-term birth 20(19.2%) and still birth 15(14.4%).

Conclusion: Intra-uterine growth restriction is frequently a sequel of hypertensive disorders of pregnancy and the frequency of IUGR in patients with PIH was found to be 65%.

Keywords: Intra-uterine growth restriction, pregnancy induced hypertension, gestational hypertension, pre-eclampsia.

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Introduction:

Hypertensive disorder is the second most common medical disorder seen during pregnancy and along with hemorrhage and infection contribute greatly to maternal morbidity and mortality.[1] Pregnancy induced hypertension (PIH) is a significant contributor to maternal and neonatal morbidity and mortality and with efficient antenatal care and early treatment has become almost a clinical rarity in developed countries.[2] However, in developing country like ours and in the rural population, it still continues to be a major obstetric problem and most deaths in PIH occur due to its complications.[3]

The frequency of hypertensive disorders of pregnancy was reported as 15% in one study from Pakistan.[4] Hypertension during pregnancy also affects the fetal outcome and associated with intrauterine demise, low birth weight and

increased risk of admission to neonatal intensive care unit. In a hospital based study from Karachi, it was found to be the leading cause of stillbirth.[5] The case fatality from hypertension during pregnancy is far higher in developing world when compared to the developed world while the etiology of hypertensive disorders of pregnancy is still elusive.[6,7]

PIH and unexplained intra-uterine growth restriction often assumed to be related to placental insufficiency and closely associated with placental dysfunction that result in fetal growth restriction.

Intra-uterine growth restriction (IUGR) is defined as those foetuses with birth weight less than the 10th percentile for the gestational age.[8]

The incidence of intra-uterine growth restriction is estimated to be approximately 5% in general obstetrics population and the prevalence reported for IUGR in PIH is 28%[9] whereas the outcomes are low apgar score (19%), abortion (11%), low birth weight (31%), preterm birth (2%), still birth (10%),[10] neonatal morbidity and mortality and even may lead to childhood sequels.[11]

Early diagnosis of intra-uterine growth restriction helps in reducing perinatal and neonatal complication, mortality and morbidity.[8]

Therefore, the rationale of the present study was to evaluate the IUGR and outcome in pregnant ladies with hypertension in our population and to identify the variations in proportions as far as IUGR and its outcome is concerned so that antenatal preventive measure can be taken to generate the local data and guidelines so that the subjects can be managed and rationalized properly based on the findings of present study.

Material and Methods:

This cross-sectional study was conducted from 1st June 2021 to 31st December 2021, involving 160 pregnant women presenting at the Jinnah Medical College Hospital, Karachi. All the pregnant ladies of 15-45 years of age either nulliparous or multiparous had pregnancy induced hypertension after 20 weeks of gestation were recruited for the study while informed consent was taken from every relevant patient. All the subjects with PIH were observed for IUGR and outcome according to the parameters mentioned in operational definition. The clinical maneuvers (history and clinical examination) were performed by researcher while the ultrasound was performed by sonologist. The data was collected on pre-designed proforma. Taken the lowest prevalence of IUGR in PIH 28%[12] d= 7%, n = 160 patients with pregnancy induced hypertension will be taken.

Pregnant women with evidence of chronic or transient hypertension with proteinuria, known chronic kidney disease, ischemic heart disease and with connective tissue /autoimmune disorders were excluded.

The data was analyzed in SPSS version 16.00. The frequency and percentage was calculated for maternal and gestational age, residence, parity, duration of disease, mode of delivery, IUGR and outcome in PIH. The mean and standard deviation (SD) was calculated for maternal and gestational age and duration of disease. The stratification was done for maternal and gestational age, mode of delivery (caesarean section or vaginal delivery), parity, urban, rural and duration of disease to see the effect on outcome and to control the effect modifiers. The post stratification chi-square test was applied on categorical variables at 95% confidence interval and the p-value ≤0.05 was considered as statistically significant.

The study was approved by the hospital's research and ethics committee.

Operational definitions:

Pregnancy induced hypertension: defined as blood pressure higher than 140/90 measured on two separate occasions, more than 6 hours apart without the presence of protein in the urine develop after 20 weeks of gestation.

Intra-uterine growth restriction (IUGR): weight below the 10th percentile for gestational age (on ultrasound)

Table 1: Demographical and clinical profile of the study population

Maternal age (yrs)	Frequency (n = 160)	Percentage (%)
<20	36	22.5
21-30	51	31.9
31-40	57	35.6
>40	16	10.0
Gestational age (wks)		
<28	50	31.2
28-34	60	37.5
35-37	30	18.7
>37	20	12.5
Residence		
urban	65	40.6
rural	95	59.4
parity (p)		
0-1	72	45
2-5	48	30
>5	40	25
mode of delivery		
cesarean section	91	56.9
vaginal delivery	69	43.1
IUGR		
yes	104	65
no	56	35

Table 2: The mean ±sd for quantitative variables of the study population

Quantitative variables	Mean ±SD
Maternal age	38.95±8.92
Gestational age	33.73±6.92
Duration of disease	4.91±1.52
Parity	3.00±2.0
Baby weight	1811±3.32
Apgar score	4.21±1.21

Table 1: Demographical and clinical profile of the study population

		Still Birth		
		Yes	No	Total
Maternal age (yrs)	15-19	5	31	36
		33.3%	34.8%	34.6%
	20-29	5	23	28
		33.3%	25.8%	26.9%
	30-39	3	28	31
		20.0%	31.5%	29.8%
	40-45	2	7	9
		13.3%	7.9%	8.7%
	Total	15	89	104
		100.0%	100.0%	100.0%

Outcome:

1. Low apgar score: less than 6 at 5-minutes
2. Low birth weight: Babies who were born weighing less than 2,500 grams.
3. Preterm birth: birth of a baby at less than 37 weeks gestational age.
4. Still birth: baby born dead after 24 completed weeks of pregnancy.

Results:

During 6-months study period total 160 pregnancy induced hypertension evaluated for intra-uterine growth restriction (IUGR). The mean±SD for maternal age (years), gestational age (weeks), duration of disease (weeks), baby weight (grams) and apgar score for overall population was 38.95±8.92, 33.73±6.92, 3.00±2.0, 4.91±1.52, 1811±3.32 and 4.21±1.21. The demographical and clinical profile of the study population is presented in table 1 and IUGR was detected in 104(65%) babies.

The mean±SD for quantitative variables of the study population are presented in table 02 while the results and stratification for study variables are stated as: regarding the IUGR in relation to maternal age, 34.6% (15-19 years), 26.9% (20-29 years), 29.8% (30-39 years) and 8.7% (40-45 years) [p=0,00]. The IUGR in context to gestational age 35.6% (21-29 years) and 64.4% (30-42 years) [p=0.05] while the IUGR in relation to residence, urban 41.3% and rural 58.7% [p=0.80] whereas the IUGR in context to duration of disease ≤ 2 weeks 57.7% and > 2 weeks 42.3% (p=0.00). The IUGR in relation to parity nulliparous 69.2% and multiparous 30.8% (p=0.00) while the IUGR in context to mode delivery cesarean section 60.6% and vaginal delivery 39.4% (p=0.19). The outcome observed were low apgar score 28(26.9%), abortion 13(12.5%), low birth weight 28(26.9%), preterm birth 20 (19.2%) and still birth 15(14.4%).

The relation of still birth with maternal age, gestational age and parity is presented in table 3, 4 and 5 respectively.

Table 4: The still birth and gestational age

		Still Birth		
		Yes	**No**	**Total**
Gestational age (wks)	21-29	6	31	37
		40.0%	34.8%	35.6%
	30-42	9	58	67
		60.0%	65.2%	64.4%
	Total	15	89	104
		100.0%	100.0%	100.0%

Table 5: The still birth and parity

		Still Birth		
		Yes	**No**	**Total**
Parity	Nulliparous	11	53	64
		73.3%	59.6%	61.5%
	Multiparous	4	36	40
		26.7%	40.4%	38.5%
	Total	15	89	104
		100.0%	100.0%	100.0%

Discussion:

Hypertensive disorders in pregnancy account for increased perinatal morbidity and mortality when compared to uneventful gestations and the IUGR is the main complication of the fetus in hypertensive pregnancies.[12] The degree of intra-uterine growth restriction also has a negative effect on early morbidity.[13] During embryogenesis and development fetus obtains oxygen and nutrients from the mother through placental micro-circulation. Pregnancy induced hypertension and pre eclampsia are closely associated with placental dysfunction.[14] Pathogenesis of pregnancy induced hypertension and intra-uterine growth restriction is strictly connected with poor supply of the fetomaternal unit with well oxygenated blood rich in all nutritional substances.[15] There was an association between pregnancy induced hypertension and parity of mother.[16] PIH is common among primigravida and probably the main factor in the genesis of IUGR and reduced placental weight.[17] In our study 65% patients with IUGR the primigravida were(61.5%) and remaining were multiparous (38.5%), this is comparable with study conducted formerly where primigravida were 57.5% and multigravida were 42.5%.[3]

In contrast to this different study conducted by Gandhi et al and Khosravi et al 43.15% among primiparous 56.85% multiparous and 32.8% PIH mother were nullipara while 67.2% were multipara respectively.[3]

The frequency of intra-uterine growth restriction was 23% in a study conducted at public sector hospital[18] Pre-eclampsia, in particular, is associated with substantial risk to both the mother and fetus.[19] In the study conducted in Catholic University of the Sacred Heart, Rome, Italy reported that rate of IUGR was 22.8% in PIH and 50.7% in pre eclampsia.[20] In a study conducted at the two centers at Aurora Health Care, USA IUGR was detected in 20% and 28% in patients with PIH.[21] Our results can be comparable with the study reported IUGR at Nagoya City University, Japan where 57% cases with IUGR were having early onset PIH and 43% patients with IUGR were having late onset PIH.[22]

Perinatal outcome in hypertensive disorders of pregnancy is dependent on gestational age and/or the presence of fetal growth restriction. Increased surveillance should be undertaken in patients with PIH so that perinatal outcome can be improved by appropriate intervention.[23] It was found that moderate and severe PIH early developed during pregnancy could increase the risk of perinatal mortality while the cesarean delivery could decrease the risks in women with PIH.[24] In present study the still birth and low birth weight was identified as 14.4% and 26.9% in ladies with pregnancy induced hypertension and consistent with the study by Ananth CV, et al.[25]

The present study results showed a low stillbirth rate and highlighted low birth weight and pre-maturity as the perinatal consequences. An early diagnosis of the hypertension in addition to a suitable intervention meant higher chances of having a pregnancy without complications to the mother and negative effect's to the fetus' health.[26] While in the study by Muti M, et al the observations in relation to outcome were low

birth weight was 16%, low apgar score 20%, preterm birth 13% and still birth in 5% women with pregnancy induced hypertension.[27] In the study by Seyom E et al, the fetal outcomes indicates still birth 10.2%, low birth weight of 30.5%, and low Apgar score of 18.5%, abortion 10.7% and preterm delivery 31.4%.[28] Results of present study shown that PIH was associated with delivering a low birth weight baby, considering that low birth weight is a major determinant as well as have long term impact on health outcomes in adult hood, the increased risk due to PIH is a cause for concern. Thus preventing and/or managing PIH becomes a priority as one of the ways of reducing the risk of low birth weight and the associated consequences.[29]

Hypertensive disorders during pregnancy were associated with a higher risk of adverse perinatal outcomes. Women with hypertensive disorders during pregnancy had a higher risk of (emergency) caesarean section, pre-term birth, neonatal death, low birth weight children and neonates with low Apgar score. It has been observed the high quality care in an economically poor setting that may in part be attributed to a successful quality improvement program, indicating the value of a continued focus on optimizing quality of care.[30]

The prevalence reported for of PIH was high and the women with PIH were at higher risk of adverse pregnancy outcomes.[31] Poor knowledge of management of PIH and inadequate resources are a threat to the proper management of PIH. This underscores the need for human resource capacity building and resource mobilization for proper management of women accessing maternity services in our population and the resources for antenatal health care centers must be made available by healthcare authorities.

Conclusion:

Intra-uterine growth restriction is frequently a sequel of hypertensive disorders of pregnancy and present study it is reported as 65% while regarding the outcome low apgar score 28(26.9%), abortion 13(12.5%), low birth weight 28(26.9%), pre-term birth 20(19.2%) and still birth 15(14.4%). Thus, the assessment of this growth disorder is an easy task in modern obstetrics and can be conveniently diagnosed and monitored using clinical and ultra-sonographic assessment. Timely intervention in the form of delivery can prevent the hostile consequences of PIH on fetus and reduce the perinatal morbidity and mortality.

Limitations of study: The study is not without limitations as it is a hospital-based study so limiting the other areas of the community and may not expose the accurate prevalence in the community so further studies are needed for more elaboration.

Conflict of interest: None

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Role and contribution of authors:

Shazia Aftab, collected the data, referenes and did the initial wrtiteup.

Samina Ayaz, collected the data and helped in introduction writing.

Syeda Fariha Hussain, collected the data, references and helped in discussion writing.

Agha Saddam Hussain, critically review the article and made final changes.

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