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Risk factors of intrauterine growth retardation in women admitted in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh

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Abstract
Intrauterine growth restriction is said to be present those babies whose birth weight is below the tenth percentile of the average for the gestational age. Babies who are born with Intrauterine Growth Retardation (IUGR) have higher rates seizeurs, sepsis, respiratory failure and neonatal mortality. The objective of the study is to determine the risk factors of intrauterine growth retardation (IUGR) admitted in BSMMU. This will be an observation study, which include 100 pregnant women having IUGR admitted in the Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from January to June 2022. Data will be collected by taking detailed history, Socio-economic status, menstrual & obstetric history, personal history, medical history, general examination, per-abdominal examination, per-vaginal examination, investigations will be assessed along with informed written consent. Among them, 100 were babies with IUGR. So, the frequency was found to be 2.79%. In this study, out of 100 IUGR cases, 22 (22.0%) had low maternal basal metabolic index (BMI), 20 (20.0%) had anaemia and 9 (9.0%) had hypothyroidism. Among the IUGR babies, 68 (68.0%) were female babies whereas 32 (32.0%) were male babies. The parity index in pregnant women with IUGR. The clinical examination revealed the symphysiofundal height of more >3 cm less in 82 (82%) whereas >6 cm less in 18 (18%) cases. The ultasonological study revealed abdominal circumference of less than tenth percentile in all 100 cases. Amniotic fluid index showed between 5-8cm in 52 (52%) whereas <5 cm in 48 (48%) cases. Maternal risk factors like low pregnancy body mass index, preeclampsia, anaemia, hypothyroidism and placental factors like retro placental hemorrhage were mainly responsible for intrauterine growth restriction. The early identification of risk factors and management of the same antenatally is an important issue to prevent adverse perinatal outcomes associated with IUGR.

Keywords: Intrauterine growth restriction, maternal factors, perinatal outcomes

Introduction
One of the leading causes of perinatal morbidity and mortality is intrauterine growth restriction (IUGR), a condition in which the fetus is undernourished for gestational age [1]. Normally, IUGR is present in only a small percentage of deliveries but has been found to be increased in women who present in preterm labor and who go on to a premature delivery [2]. Found that 10% of premature fetuses were less than the 5th percentile of birth weight compared with only 2% at term. The growth of the fetus is indicated by its anthropometric measurements at birth, particularly weight. In fact, the birth weight of all babies is file most important determinant of its morbidity and mortality [3]. Birth weight is one of the most important of health indicators of healthy infants in all of countries and is considered as the unique indicator for pregnancy outcomes. Risk factors of IUGR will not only limit the ability of fetus to reach the growth potential or may threaten the ability of the fetus to survive but also raise complication in intrapartum, postpartum and long term post natal growth. The higher the prevalence of LBW babies, the higher the percentage of IUGR. In developing countries there is an excess of IUGR babies within their LBW populations. IUGR seems to be associated with an increased risk of development of infection, due to a lowered level of immunity [3]. Babies who are born with IUGR have higher rates of seizures, sepsis, respiratory failure and neonatal mortality.

These infants also have more problems with learning. Furthermore, IUGR has been implicated as a risk factor for health problems in adulthood, such as diabetes, hypertension and cardiovascular disease [4]. Birth weight is an important determinant of the chances of the newborn to survive and experience healthy growth and development. Globally, almost 25 million per year are LBW. Over 90% of these infants are born in developing countries. Birth weight data are needed for monitoring and evaluating progress towards achieving national strategies for lowering LBW and IUGR, as well as global child survival goals of reducing infant and under-5 child mortality [5]. Risk factors of IUGR includes: Fetoplacental factors, Genetic disorder such as Trisomy 13, 18, 21, chromosomal deletion, turner's syndrome, neural tube defect, achondroplasia, abdominal wall defects etc. congenital infection, cytomegalovirus rubella, herpes, varicella-zoster, toxoplasmosis, malaria etc. Placental disorders; placenta previa, placental infarction, chronic partial separation, chorionic villitis, placental malformations (circumvallate, battledore placenta twin-twin transfusion syndrome) multiple gestation. Maternal factors: Maternal pre-eclampsia, chronic hypertension, severe malnutrition, anaemia, chronic renal disease, heart disease, diabetes with vascular lesions, connective tissue disorder, maternal alcohol, smoking and drug abuse during pregnancy [6]. Sharon and Gilberto [4] in a study in California found that mothers with infants who had IUGR were more likely to be younger than 20, to have less than a high school education, to have smoked during pregnancy and to have a history of having an infant with LBW. Vega, *et al*. [7] in a study about risk factors for LBW an IUGR in Santiago (Chile) found that IUGR in previous pregnancies, maternal smoking, month of first prenatal visit, number of visit, maternal pregnancy weight and maternal height were significantly associated with IUGR. Knowledge about risk factors of IUGR will help to design locally and culturally appropriate interventions to reduce the occurrence of it. The aim of the present study will be to determine the risk factors associated will intrauterine growth retardation (IUGR). The identification of such associations may help to identify groups at risk and create new strategies for intervention and prevention of adverse pregnancy outcomes and their long term consequences [8].

Materials and Methods

Place of Study: BSMMU.

Study design: This observational study.

Study Period: 6 months (January to June 2022).

Study Population: The study population will be pregnant women with IUGR admitted in the in-patient Department of Obstetrics and Gynecology in BSMMU.

Sample size and the statistical basis of it: To determine the sample size the following formula was followed =

$$n = \frac{z^2 pq}{d^2}$$

The current study duration is only, so the targeted sample size cannot be collected during this study duration, therefore 100 samples will be enrolled.

Sampling method(s): All pregnant women with IUGR admitted for delivery will be recruited for the study purposively for six months.

Inclusion and Exclusion criteria

Inclusion criteria

All the pregnant

1. Women with pregnancy induced hypertension.
2. Pregnancy with diabetes.
3. Pregnancy with heart disease.
4. Pregnancy with renal disease.
5. Pregnancy with hemoglobinopathy.
6. Pregnancy with placenta previa or abruptio placenta.
7. Pregnancy with TORCH (Toxoplasmosis, Rubella, Cytomegalovirus, Herpes infection).

Exclusion criteria

1. Patients under 18 or more than 35 years of age.
2. Multiple gestations.
3. Constitutionally small baby.

Operational definitions

The sequence of task Definition of IUGR

Intrauterine growth restriction is defined as estimated fetal weight at or below the 10th percentile for gestational age.

Abdominal palpation

Abdominal palpation, is accomplished using the Leopold maneuvers, [9] but its ability to predict fetal weight is limited [10]. Abdominal palpation should only be regarded as a tool to raise suspicion of low birth weight.

Symphysis-fundal height

Discordance between the gestional age and the size of the uterus is the most common finding in women at risk of IUGR. Measurment of uterine height is a simple method to estimate the fetal growth and identify women at risk. The uterine height should be measured in centimeters or by gestational age from the upper border of the pubic symphysis to the fundus of the uterus. The best way to use the uterine height measurements is to plot them against a standerd curve derived from a normal obstetrical population such as that developed by Belizan *et al*. [11]. One Cochrane review concluded that there is not enough evidence to evaluate the usefulness of S-F height measurements during antenatal care [12]. Yet, SF height measurement is still the most commonly used screening tool for IUGR [13].

Amniotic fluid volume estimation: Measurement of the amniotic fluid volume is important in the surveillance of IUGR. Oligohydramnios is considered when the largest vertical pocket of amniotic fluid is less than 2 cm or the amniotic fluid index (AFI) is less than 5 cm. This index is the sum of the vertical amniotic fluid pocket depths in the 4 abdominal quadrants.

Procedures of collecting data

- The total cases of pregnant women admitted for delivery in OBS and GYNAE department of BSMMU for 6 months will be asked for proper history.
- Data will be collected by face-to-face interview with the mother by using a pre-design questionnaire.

- Data along with maternal and fetal outcome and their complications will be collected. The following methods will be used for measuring the anthropometry.

Procedures of data analysis of interpretation: After editing and coding, the coded data will be directly entered into the computer by using SPSS software release for Windows, version 16.0 (SPSS, Inc. Chicago. III). Data cleaning validation and analysis will be performed using the SPSS software. Categorical data will be presented as frequency, percentage and continuous variable will be expressed as Mean ± SD (standard deviation). For statistical analysis continuous variable will be analyzed by unpaired t-test and categorical data will be analyzed by $\chi 2$ test (Chi-square test). A 'p' value of <0.05 will be considered significant.

Quality assurance strategy: At every step of data collection, processing and analysis, suggestion from a statistician will be sought and the data collected will be rechecked to avoid entry of wrong data and ensure analysis using appropriate statistics.

Results

Among them, 100 were babies with IUGR. So, the frequency was found to be 2.79%. Out of 100 IUGR cases, 22 (22.0%) had low maternal basal metabolic index (BMI), 20 (20.0%) had anaemia and 9 (9.0%) had hypothyroidism as shown in Table 1. Among the IUGR babies, 68 (68.0%) were female babies whereas 32 (32.0%) were male babies (fig-1). The parity index in pregnant women with IUGR is as shown in Table 2. The clinical examination revealed the symphysiofundal height of more >3 cm less in 82 (82%) whereas >6 cm less in 18 (18%) cases. The ultasonological study revealed abdominal circumference of less than tenth percentile in all 100 cases. Amniotic fluid index showed between 5-8 cm in 52 (52%) whereas < 5 cm in 48 (48%) cases. Non stress test was non-reactive in 27 (27%) and deceleration in 8 (8%) cases. Likewise, Doppler study showed the changes in umbilical artery in 66 (66%) cases. Table 3 showed the different modes of delivery in pregnant women with IUGR babies. The Table 4 showed the different perinatal outcomes in IUGR babies.

Table 1: Antenatal risk factors amongst women with IUGR (N=100)

Antenatal Risk Factors	Number	Percentage
Low Maternal BMI	22	22.0
Anemia	20	20.0
Chronic hypertension	3	3.0
Preeclampsia	20	20.0
Hypothyroidism	9	9.0
Retro placement clot	10	10.0
Smoker	3	3.0
Overt diabetes	2	2.0
Gestational diabetes Mellitus	5	5.0
Previous pregnancy with	4	4.0
Women on anticonvulsants	2	2.0
Total	100	100.0

In this study, out of 100 IUGR cases, 22 (22.0%) had low maternal basal metabolic index (BMI), 20 (20.0%) had anaemia and 9 (9.0%) had hypothyroidism as shown in Table 1.

Among the IUGR babies, 68 (68.0%) were female babies whereas 32 (32.0%) were male babies.

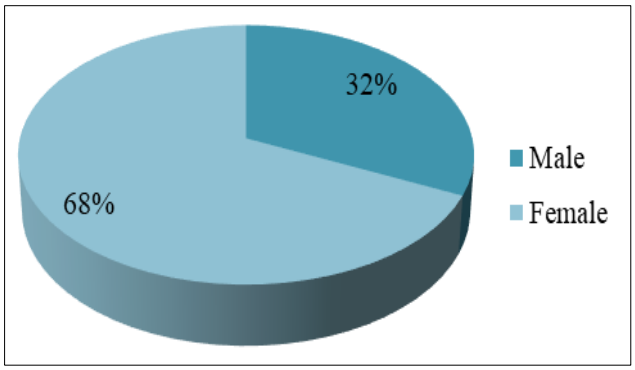

Fig 1: Sex distribution of IUGR.

Table 2: Parity index amongst women with IUGR (N= 100)

Parity Index Amongst	Number	Percentage
Null parity	82	82.0
Multipara	7	7.0
Grand Multipara	11	11.0
Total	100	100.0

Table 3: Mode of delivery amongst women with IUGR (N=100)

Mode of Delivery	Number	Percentage
Vaginal delivery	15	15.0
Forceps delivery	3	3.0
Lower segment Cesarean section	82	82.0
Total	100	100

Table 4: Perinatal outcome in IUGR babies (N=100)

Perinatal outcome	Number	Percentage
Baby weight		
< 1kg	4	4.0
1kg- < 1.5kg	16	16.0
1.5kg- < 2kg	53	53.0
2kg- < 2.5kg	27	27.0
APGAR score		
< 7	43	43.0
> 7	57	57.0
Post-delivery newborn status		
NICU admission	42	42.0
Perinatal death	6	6.0
Mother Care	52	52.0
Fetal outcome		
Preterm delivery	45	45.0
Term delivery	55	55.0

Regarding the perinatal mortality, it was more in fetuses with severe growth restriction and abnormal Doppler studies. Amongst 6 perinatal deaths, 4 were delivered by LSCS whereas 2 were vaginal delivery as they had come in active stage of labour.

Discussion

The frequency of IUGR in our study was 2.79% which is lesser than the studies performed in developed countries which ranged from 3-8%. The reason behind such a low frequency could possibly be high number of home delivery in our country [14, 15]. Among them, 100 were babies with IUGR. The parity index in pregnant women with IUGR is as shown in Table 2. The clinical examination revealed the symphysiofundal height of more > 3cm less in 82 (82%)

whereas >6 cm less in 18 (18%) cases. Our study showed that low maternal BMI was more in IUGR cases which is consistent with the other studies reporting low maternal BMI being associated with preterm delivery and IUGR [16, 17]. Our study also showed that anemia and hypertension in pregnancies like preeclampsia and chronic hypertension were significant risk factors in IUGR which is consistent with studies performed by different authors. The reason is placental insufficiencies [18-20]. The relationship of hypothyroidism with IUGR had been proven in different literature and this was also true in our study [21, 22]. Our study showed that retro placental hemorrhage was a significant risk factor in IUGR. The reason is placental insufficiencies leading to Oligohydramnios and increased perinatal morbidity and mortality. We had also noticed that women who smoke are more likely to develop IUGR and it is consistent with other studies [23]. Gestational diabetes mellitus and overt diabetes were significant risk factors in IUGR. Likewise, previous pregnancy with IUGR has significant risk in developing IUGR in corresponding pregnancy as in our study. The above findings were consistent with studies by different authors [24-26]. In our study, the clinical examination revealed the symphysiofundal height of more > 3 cm less in 82 (82%) whereas > 6cm less in 18 (18%) cases. The ultasonological study revealed abdominal circumference of less than tenth percentile in all 100 cases. The reason could be side effects of drug and seizure itself [27]. Our study showed that IUGR is more in nulliparous, the reason may be because of more nulliparous women in our study population. Our finding is somehow consistent with study performed by Saki *et al*. [21]. The green top guideline of Royal College of Obstetricians and Gynecologists recommends that serial ultrasound scanning is necessary from 26-28 weeks in women with IUGR, as clinical examinations like symphysiofundal height measurement and abdominal palpation has limited accuracy in identifying IUGR fetuses [28]. Perinatal death and longer neonatal intensive care unit (NICU) stay were among fetuses with abnormal umbilical artery Doppler and severe growth restriction and later these fetuses may develop metabolic syndrome in adulthood [29]. Our study showed that there were more IUGR babies delivered through LSCS, the reason of high LSCS delivery is IUGR itself as it is a high risk case and this finding is consistent with other Observational studies which showed that detection of growth restriction may be associated with an increased incidence of obstetric interventions [24]. In our study, most of the fetuses delivered were with the birth weight of 1.5-2 kg. We observed that the APGAR score was > 7 in most of the newborns as they were delivered by LSCS and there was a pediatrician during the delivery of IUGR fetuses for early intervention when required. One hundred and fifty five newborns required NICU admission for observation as they were prone to hypothermia and transient tachypnea. We observed good perinatal outcome in our newborns because of vigorous monitoring and early identification of IUGR. Regarding the perinatal mortality, it was more in fetuses with severe growth restriction and abnormal Doppler studies. Amongst 6 perinatal deaths, 4 were delivered by LSCS whereas 2 were vaginal delivery as they had come in active stage of labour and weight less than 1.5 kg. Our study showed that the female fetuses had more IUGR than male fetuses which is similar to other studies and there was not any definitive reason for it [23, 30]. So, it is important to timely deal with different issues like risk factors and perinatal outcomes in IUGR babies as it helps to improve the outcome. The main limitation of our study is that it was a single institutional project. For the generalization of results, it is important to perform multi-institutional studies.

Conclusion

It is concluded that IUGR is an important cause of perinatal morbidity and mortality. Some of the contributing factors like anemia, poor maternal nutritional and poor weight gain during pregnancy and hypertension during pregnancy can be prevented and detected early. Some of the causes of IUGR and subsequent fetal morbidity and mortality are preventable. Awareness among pregnant patients about nutrition, antenatal checkups are of upmost importance.

References

1. Zeitlin JA, Ancel PY, Saurel-Cubizolles MJ, Papiernik E. Are risk factors the same for small for gestational age versus other preterm births? Am J Obstet Gynecol. 2001;185:208-15.
2. Bukowski R, Gahn D, Denning J, Saade G. Impairment of growth in fetuses destined to deliver preterm. Am J Obstet Gynecol. 2001;185:463-7.
3. Patricia HC, MT Andrew. Chest Circumference as an indicator of intrauterine growt h retardation. Early Human Develop. 1996;44:161-167.
4. Sharon D, FC Gilberto. Associations of intrauterine growth restriction among term infants and maternal pregnancy intendedness, initial happiness about being pregnant and sense of control, pediatrics; c2003. wwwgoogle.com
5. Mansour E. Incidence and factors leading to Low Birth Weight in Egypt. Intl. Pediatrics. 2002;17:223-230.
6. Uzelac PS, Garmell SH. Early pregnancy risk. De Cherney Alan H, Nathan Lauren. Current Diagnosis and Treatment Obstetrics & Gynecologic. 10th Ed. McGraw-Hill; c2007. p. 288-289.
7. Vega J. Risk factors for Low birth weight and intrauterine growth retardation in Santiago, Chile. Rev. Med. Chil. 1993;121:1210-1219.
8. NIH. Consensus Development Panel on the Effect of Corticosteriods on Perinatal Outcomes. Effect of corticosteroids for fetal maturation on perinatal outcomes. The Journal of the American Medical Association. 1995;273:413-8.
9. Loeffler FE. Clinical foetal weight prediction. J Obstet Gynaecol Br Common. 1967;74:675-7.
10. Bais JM, Eskes M, Pel M, Bonsel GJ, Bleker OP. Effectiveness of detection of intrauterine growth retardation by abdominal palpation as screening test in a low risk population: An observational study. Eur J Obstet Gynecol Reprod Biol. 2004;116:164-9.
11. Belizán J, Villar J, Nardin JC, Malamud J, De VLS. Diagnosis of intrauterine growth retardation by a simple clinical method: measurement of uterine height. American Journal of Obstetrics and Gynecology. 1978;131(6):643-646.
12. Neilson JP. Symphysis-fundal height measurement in pregnancy (Cochrane review). The Cochrane Library; c2004. p. 1-9.
13. Harkness UF, Mari G. Diagnosis and management of intrauterine growth restriction. Clin Perinatol. 2004;31:743-64.

14. Thompson JM, Clark PM, Robinson E, Becroft DM, Pattison NS, Glavish N, *et al.* Risk factors for small-for-gestational-age babies: The Auckland Birth weight Collaborative Study. J Paediatr Child Health. 2001;37(4):369-75.
15. Saleem T, Sajjad N, Fatima S, Habib N, Ali SR, Qadir M. Intrauterine growth retardation - small events, big consequences. Ital J Pediatr. 2011;37:41.
16. Anthony DO, Costello MdeL. What can be done about intrauterine growth retardation? Semin Neonatol. 1999;4(3):173-81.
17. Neggers Y, Goldenberg RL. Some Thoughts on Body Mass Index, Micronutrient Intakes and Pregnancy Outcome. The American Society for Nutritional Sciences; c2003.
18. Thekkedathu VCA. Maternal and Placental Risk Factors associated with Intrauterine Growth Restriction and the Perinatal Outcomes. J South Asian Feder Obst Gynae. 2015;7(3):176-81.
19. Odegård RA, Vatten LJ, Nilsen ST, Salvesen KA, Austgulen R. Preeclampsia and fetal growth. Obstet Gynecol. 2000;96(6):950-5.
20. Rondó PH, Tomkins AM. Maternal iron status and intrauterine growth retardation. Trans R Soc Trop Med Hyg. 1999;93(4):423-6.
21. Saki F, Dabbaghmanesh MH, Ghaemi SZ, Forouhari S, RanjbarOmrani G, Bakhshayeshkaram M. Thyroid function in pregnancy and its influences on maternal and fetal outcomes. Int. J Endocrinol Metab. 2014;12(4):e19378.
22. Kilby MD, Verhaeg J, Gittoes N, Somerset DA, Clark PM, Franklyn JA. Circulating thyroid hormone concentrations and placental thyroid hormone receptor expression in normal human pregnancy and pregnancy complicated by intrauterine growth restriction (IUGR). J Clin Endocrinol Metab. 1998;83(8):2964-71.
23. Milnerowicz-Nabzdyk E, Zimmer M, Tlolka J, Michniewicz J, Pomorski M, *et al.* Umbilical cord morphology in pregnancies complicated by IUGR in cases of tobacco smoking and pregnancy-induced hypertension. Neuro Endocrinol Lett. 2010;31(6):842-7.
24. Muniyar N, Kamble V, Kumar S. IUGR Pregnancies-Feto-Maternal Outcome. Gynecol Obstet (Sunnyvale). 2017;7:440.
25. Vambergue A, Fajardy I. Consequences of gestational and presentational diabetes on placental function and birth weight. World J Diabetes. 2011;2(11):196-203.
26. Evers AC, Van RBB, Van RMM, Bruinse HW. Subsequent pregnancy outcome after first pregnancy with normotensive early- onset intrauterine growth restriction at < 34 weeks of gestation. Hypertens Pregnancy. 2011;30(1):37-44.
27. Farmen AH, Grundt J, Tomson T, Nakken KO, Nakling J, Mowinchel P, *et al.* Intrauterine growth retardation in fetuses of women with epilepsy. Seizure. 2015;28:76-80.
28. Royal College of Obstetricians and Gynecologists. Small-for-Gestational-Age Fetus, Investigation and Management (Green- top Guideline No. 31).
29. Afrasiabi N, Mohagheghi P, Kalani M, Mohades G, Farahani Z. The Effect of High Risk Pregnancy on Duration of Neonatal Stay in Neonatal Intensive Care Unit. Iran J Pediatr. 2014;24(4):423-8.
30. Radulescu L, Ferechide D, Popa F. The importance of fetal gender in intrauterine growth restriction. J Med Life. 2013;6(1):38- 9.

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