WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 5, 1179-1187. Research Article ISSN 2277– 7105

INTRAUTERINE GROWTH RESTRICTION: IDENTIFICATION, ASSOCIATED RISK FACTORS AND ITS PREVENTION

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Article Received on
16 March 2022,

Revised on 05 April 2022,
Accepted on 26 April 2022

DOI: 10.20959/wjpr20225-23426

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ABSTRACT

Background: Intrauterine growth restriction is a major and silent cause of various morbidity and mortality for the fetal and neonatal population. It is defined as a rate of fetal growth that is less than normal for the growth potential of that specific infant. **Aims & Objectives:** the aim of this study was to find out the risk factors for intrauterine growth restriction in urban areas of Rajshahi district, Bangladesh. **Materials & Method:** This cross sectional type of descriptive study was carried out among the pregnant woman in urban areas of Rajshahi district. The sample size was 150 which were selected purposively from outpatient department and indoor from Barind Medical College Hospital, Rajshahi. **Results:** It was revealed that 73.3% were in the age group of more than 35 years, Muslim (78.67%), graduates (59.33%) and service holder (52.67%). It was identified that 51.3% of the respondents were from joint family; husbands were service holder (64.0%), lived in brick build house (86.0%) with more than 40,000 BDT as monthly family income (77.3%). About 72.0% had multipara, maintained regular ante natal checkup (80.0%) without premature delivery (78.0%) with no history of intra uterine death (83.3%). Most of them did not have high blood pressure (62.67%), any convulsion during pregnancy (88.7%), any P/V bleeding (52.7%) and oligohydramnios (54.7%). It was recognized that 88.7% of the respondents did not had any history of chronic liver, renal or any other chronic diseases, did not take proper rest (53.33%)

with sedentary life (70.67%) and did not have history of intrauterine growth restriction (82.0%).

KEYWORDS: Intra uterine growth restriction, Identification, Risk factors, Bangladesh.

INTRODUCTION

The intrauterine environment influence on fetus development is a well-known determinant of individual's long-term health and quality of life. From the initial description of 23 infants being born at term weighing less than 2000 g, Warkany *et al.* introduced the idea of "intrauterine growth retardation" (IUGR). Soon, they were followed by others.[1-3] They considered IUGR "all conditions leading to a marked reduction in size during intrauterine life",[4] mainly represented by reduced birth weight. Although all of them have described pregnancies and infants with a wide variation of phenotype, with and without hypertensive syndromes or morphologic anomalies, for instance, the turning points were to consider the environment in which the fetus was developing and the placenta role in this process.

The first thousand days of life—between conception and a child's second birthday—are a delicate time, when the health foundations of a lifetime are laid. Appropriate nourishment during this crucial period of life has a profound impact not only on the early life growth and development, but also on the lifelong health of the individual.[5] This concept should be expanded to include more than just nutrition in the strict sense, as the whole environment to which the infant is exposed is extremely important. Intrauterine growth restriction (IUGR) is a paradigmatic condition in which a "hostile intrauterine environment" can hamper fetal development with a potential impact on long-term health.[6] The emerging term "exposome" refers to the whole set of nongenetic exposures that, together with the genome, determine the final phenotype during the course of a lifetime.[7] Untargeted metabolomics is evolving as a novel tool for studying the effects of the endogenous and exogenous environment. Taking an untargeted hypothesis-generated approach, metabolomics enables the simultaneous qualitative and quantitative analysis of thousands of different metabolites in a biological sample, enabling the identification of biomarkers and metabolic patterns characteristic of a given condition. Among the "-omic" sciences, metabolomics is the one that comes closest to phenotyping. Such studies are typically performed on biofluids, which are analyzed with platforms such as nuclear magnetic resonance (NMR) spectroscopy or mass spectrometry (MS). Unexpected, or even unknown, metabolites may be revealed as important in

characterizing specific groups of individuals, prompting new pathophysiological hypotheses on the condition under study.[8]

Intrauterine growth restriction (IUGR) is a major and silent cause of various morbidity and mortality for the fetal and neonatal population. IUGR is an end result of various etiologies that includes maternal, placental and fetal factors and recently added genetic factors too, also contribute to IUGR. In this study we explained and identified the antenatal aspect of IUGR, associated risk factors and management with proven preventive intervention.

MATERIALS AND METHODS

This was a cross sectional type of comparative study which was conducted in indoor and outpatient department (OPD) of Barind Medical College Hospital, Rajshahi, Bangladesh. All the pregnant women in urban areas of Rajshahi district attending OPD and indoor of Barind Medical College Hospital, Rajshahi during the study period were considered as study population. Patients with others pregnancy problems were excluded. So, total sample size was taken 150 after calculating the sample size. Purposive sampling technique was used. The researcher himself collected data from the pregnant women attending indoor and OPD of Barind Medical College Hospital, Rajshahi by face to face interview through a partially structured questionnaire. Baseline information on some selected socio-demographic and biological characteristics of the respondents and information regarding IUGR was collected. All efforts were made to collect data accurately. For open questions, the respondents were asked in such a manner so that they could speak freely and explain their opinion in a normal and neutral way. No leading questions were asked. There was always a female doctor during data collection. Statistical analyses of the results were obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-23). Prior to the commencement of the study, the research protocol was approved by the ethical committee of the Institute of Biological Sciences of University of Rajshahi. The permission of the authority of Barind medical College Hospital, Rajshahi was taken before starting the study.

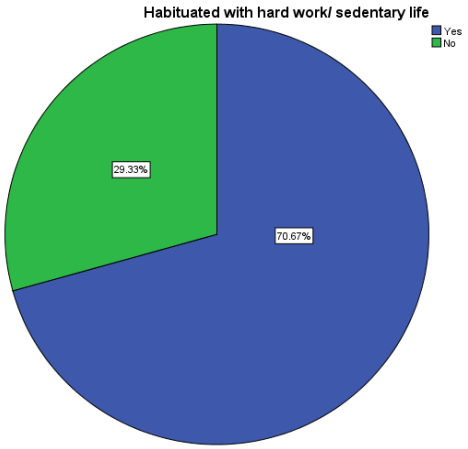
RESULTS

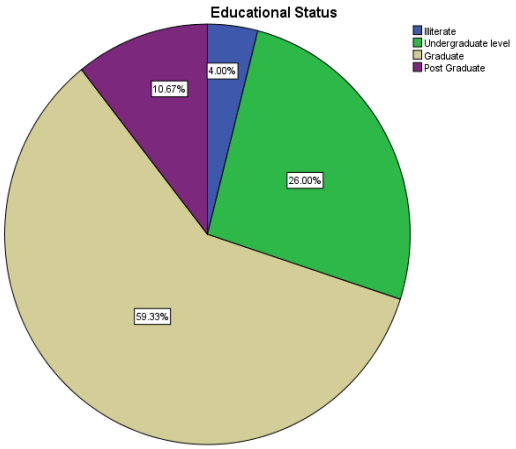
Table no: 01. Distribution of the respondents with different socio-demographic variables.

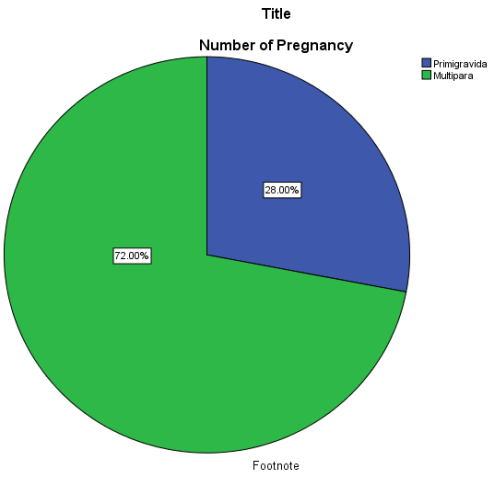
Variables		Frequency	Percentage
Age in group	<35 Years	110	73.3
	>35 years	40	26.7
Occupation of husband	Service holder	96	64.0
	Business	52	34.7
	Unemployed	1	0.7
	Others	1	0.7
Housing condition	Brick built	129	86.0
	Brick with tin shade	19	12.7
	Full in the shade	1	0.7
	Others	1	0.7
Monthly family income	<10000 Tk	1	0.7
	10000-20000 Tk	6	4.0
	21000-40000 Tk	27	18.0
	>40000 Tk	116	77.3
Maintaining regular antenatal checkup	Yes	120	80.0
	No	30	20.0
Weight of last child	<2.5 Kg	41	27.3
	>2.5 Kg	109	72.7
History of intrauterine death (IUD)	Yes	25	16.7
	No	125	83.3
History of convulsion during pregnancy	Yes	17	11.3
	No	133	88.7
History of antepartum haemorrhage (P/V bleeding during pregnancy)	Yes	71	47.3
	No	79	52.7
history of oligohydramnios (low level of amniotic fluid volume)	Yes	82	54.7
	No	68	45.3
history of chronic liver, renal or any others chronic systemic diseases	Yes	17	11.3
	No	133	88.7
History of taking egg, meat, fish and sufficient vegetables during the period of pregnancy	Yes	127	84.7
	No	23	15.3
History of IUGR/IUD	Yes	27	18.0
	No	123	82.0

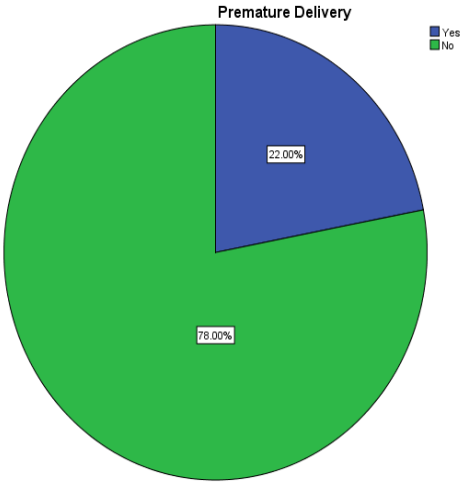
Regarding age group of the respondents it was revealed that 73.3% were in the age group of more than 35 years age group and 26.7% were less than 35 years age group, 64.0% of the respondents' husbands' were service holders, 34.7% were in business, 0.7% were unemployed and 0.7% were in others profession, 86.0% of the respondents lived in brick

build house, 12.7% lived in brick with tin shade, 0.7% in lived full in the shade and 0.7% lived in others places, it was invent that 77.3% of the respondents had >40000 Tk as monthly family income, 18.0% had 21000-40000 Tk, 4.0% had 10000-20000 Tk and 0.7% had <10000 Tk as monthly family income, it was discovered that 80.0% of the respondents' maintained regular antenatal checkup and 20.0% did not maintain this, 83.3% of the respondents did not have any history of intra uterine death and 16.7% had this history, 88.7% of the respondents did not have any history of convulsion during pregnancy and 11.3% had the history of convulsion, it was examined that 52.7% of the respondents had not have any history of P/V bleeding during pregnancy and 47.3% had the bleeding history. It was identified that 54.7% of the respondents did not have any history of oligohydramnios and 54.7% had the history, 88.7% of the respondents did not had any history of chronic liver, renal or any other chronic diseases and 11.3% had the history, 84.7% of the respondents took egg, meat, fish and sufficient vegetables during the period of pregnancy and 15.3% did not take these foods, 82.0% of the respondents did not have history of IUGR/IUD and 18.0% had the history.









It was exposed that 59.33% of the respondents were graduates, 26.0% were in under graduate level, 10.67% had post graduate level of education and 4.0% were illiterate, it was found that 72.0% of the respondents had multipara and 28.0% had primi gravid, it was found that 78.0% did not have any premature delivery and 22.0% had this type of delivery. Regarding habituated with hard work during the time of pregnancy it was found that 70.67% of the respondents had sedentary life and 29.33% did not had sedentary life (Figure 1-4).

DISCUSSION

IUGR is an important health problem of developing countries around the world. There are multiple causes for IUGR including maternal, fetal, placental, and genetic factors. Mothers with high risk factors for IUGR fetus should be followed up closely for any complications. The IUGR fetus needs an early diagnosis and management so that neonatal and perinatal mortality can be minimized. Regarding age group of the respondents it was revealed that 73.3% were in the age group of more than 35 years age group and 26.7% were less than 35 years age group. In another study the mean age was 31.26 years.[9] It was exposed that 59.33% of the respondents were graduates, 26.0% were in under graduate level, 10.67% had post graduate level of education and 4.0% were illiterate. It was found that 64.0% of the respondents' husbands' were service holders, 34.7% were in business, 0.7% were unemployed and 0.7% were in others profession. It was originated that 86.0% of the respondents lived in brick build house, 12.7% lived in brick with tin shade, 0.7% in lived full in the shade and 0.7% lived in others places. It was invent that 77.3% of the respondents had >40000 Tk as monthly family income, 18.0% had 21000-40000 Tk, 4.0% had 10000-20000 Tk and 0.7% had <10000 Tk as monthly family income. In another study the socio economic status was middle income group.[10] It was found that 72.0% of the respondents had multipara and 28.0% had primi gravid. It was discovered that 80.0% of the respondents' maintained regular antenatal checkup and 20.0% did not maintain this. Intrauterine growth determines the perinatal, postnatal, and adult life development.[11] It was found that 78.0% did not have any premature delivery and 22.0% had this type of delivery. The unfavorable uterine environment causing growth restriction results in programming that predisposes IUGR infants to long-term health issues such as poor physical growth, metabolic syndrome, cardiovascular disease, neurodevelopmental impairment and endocrine abnormalities, warranting careful monitoring.[12] It was noticed that 72.7% of the respondents had child of >2.5 Kg and 27.3% had child of <2.5 Kg. It was observed that 83.3% of the respondents did not have any history of intra uterine death and 16.7% had this history. Intra uterine death was

associated with IUGR.[13] IUGR is associated with increased risk of development in adult life of metabolic diseases including but not limited to hypertension, diabetes, obesity, dyslipidemia, and the metabolic syndrome.[14] It was examined that 88.7% of the respondents did not have any history of convulsion during pregnancy and 11.3% had the history of convulsion. It was examined that 52.7% of the respondents had not have any history of P/V bleeding during pregnancy and 47.3% had the bleeding history. P/V bleeding is very important to notice for IUGR.[15] It was identified that 54.7% of the respondents did not have any history of oligohydramnios and 54.7% had the history. A cohort with 1006 children was monitored during prenatal, at birth, and two years of age. Bayley-III screening was used to evaluate of fine and gross motor skills. The data did not indicate an increased risk for motor delays in the PT or IUGR, composed mainly by mild cases.[16] It was recognized that 88.7% of the respondents did not had any history of chronic liver, renal or any other chronic diseases and 11.3% had the history. Regarding habituated with hard work during the time of pregnancy it was found that 70.67% of the respondents had sedentary life and 29.33% did not had sedentary life. It was recognized that 84.7% of the respondents took egg, meat, fish and sufficient vegetables during the period of pregnancy and 15.3% did not take these foods. It was recognized that 82.0% of the respondents did not have history of IUGR/IUD and 18.0% had the history. The common risk factors include maternal causes (hypertension, diabetes, cardiopulmonary disease, anemia, malnutrition, smoking, drug use), fetal causes (genetic disease including aneuploidy, congenital malformations, fetal infection, multiple pregnancies), and placental causes (placental insufficiency, placental infarction, placental mosaicism).[17]

CONCLUSION

Fetal intrauterine growth restriction presents a complex management problem for the clinician. The failure of a fetus to achieve its growth potential imparts a significantly increased risk of perinatal morbidity and mortality. Consequently, the obstetrician must recognize and accurately diagnose inadequate fetal growth and attempt to determine its cause. Growth aberrations, which are the result of intrinsic fetal factors such as aneuploidy and multifactorial congenital malformations, and fetal infection, carry a guarded prognosis. However, when intrauterine growth restriction is caused by placental abnormalities or maternal disease, the growth aberration is usually the consequence of inadequate substrates for fetal metabolism and, to a greater or lesser degree, decreased oxygen availability. Careful monitoring of fetal growth and well-being, combined with appropriate timing and mode of

delivery, can best ensure a favorable outcome. Ultrasound evaluation of fetal growth, behavior, and measurement of impedance to blood flow in fetal arterial and venous vessels form the cornerstone of evaluation of fetal condition and decision making.

REFERENCES

1. Warkany J, Monroe BB, Sutherland B. Intrauterine growth retardation. Am J Dis Child., 1961; 102: 249–279.
2. Gruenwald P. Growth of the human fetus. I. Normal growth and its variation. Am J Obstet Gynecol, 1966; 94(8): 1112–9.
3. Rumbolz WL, Edwards MC, McGoogan LS. The small full term infant and placental insufficiency. Obstetrical & Gynecological Survey, 1961; 16(5): 616–618.
4. Gruenwald P. Chronic fetal distress and placental insufficiency. Neonatology, 1963; 5(3-4): 215–265.
5. Cusick SE, Georgieff MK. The Role of Nutrition in Brain Development: The Golden Opportunity of the "First 1000 Days" J. Pediatr, 2016; 175: 16–21.
6. Nardozza LM, Caetano AC, Zamarian AC, Mazzola JB, Silva CP, Marçal VM, Lobo TF, Peixoto AB, Araujo JE. Fetal growth restriction: Current knowledge. Arch. Gynecol. Obstet, 2017; 295: 1061–1077.
7. Buck Louis GM, Smarr MM, Patel CJ. The Exposome Research Paradigm: An Opportunity to Understand the Environmental Basis for Human Health and Disease. Curr. Environ. Health Rep., 2017; 4: 89–98.
8. Carraro S, Giordano G, Reniero F, Perilongo G, Baraldi E. Metabolomics: A new frontier for research in pediatrics. J. Pediatr, 2009; 154: 638–644.
9. Mortaz M, Fewtrell MS, Cole TJ, Lucas A. Birth weight, subsequent growth, and cholesterol metabolism in children 8–12 years old born preterm. Arch. Dis. Child., 2001; 84: 212–217.
10. Musa MG, Kagura J, Pisa PT, Norris SA. Relationship between early growth and CVD risk factors in adolescents. J. Dev. Orig. Health Dis., 2016; 7: 132–143.
11. Gaio P, Verlato G, Daverio M, Cavicchiolo ME, Nardo D, Pasinato A, de Terlizzi F, Baraldi E. Incidence of metabolic bone disease in preterm infants of birth weight <1250 g and in those suffering from bronchopulmonary dysplasia. Clin. Nutr. ESPEN, 2018; 23: 234–239.
12. Aggett PJ, Agostoni C, Axelsson I, De Curtis M, Goulet O, Hernell O, Koletzko B, Lafeber HN, Michaelsen KF, Puntis JW. ESPGHAN Committee on Nutrition. Feeding

preterm infants after hospital discharge: A commentary by the ESPGHAN Committee on Nutrition. J. Pediatr. Gastroenterol. Nutr., 2006; 42: 596–603.

13. Ornoy A. Prenatal origin of obesity and their complications: Gestational diabetes, maternal overweight and the paradoxical effects of fetal growth restriction and macrosomia. Reprod. Toxicol, 2011; 32: 205–212.
14. Corvaglia LI. Nutritional Requirements of Extremely-Low-Birth-Weight Preterm Infants. J. Pediatr. Gastroenterol. Nutr., 2015; 61(1): S1–S25.
15. Cosmi E, Visentin S, Fanelli T, Mautone AJ, Zanardo V. Aortic intima media thickness in fetuses and children with intrauterine growth restriction. Obstet. Gynecol, 2009; 114: 1109–1114.
16. Singhal A, Cole TJ, Fewtrell M, Kennedy K, Stephenson T, Elias-Jones A, Lucas A. Promotion of faster weight gain in children born small for gestational age. Is there an adverse effect on later blood pressure? Circulation, 2007; 115: 213–220.
17. Franz AR, Pohlandt F, Bode H, Mihatsch WA, Sander S, Kron M, Steinmacher J. Intrauterine, early neonatal, and postdischarge growth and neurodevelopmental outcome at 5.4 years in extremely preterm infants after intensive neonatal nutritional support. Pediatrics, 2009; 123: e101–e109.