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Intra Uterine Growth Restriction and Related Risk Factors

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Abstract

Background: Intra uterine growth restriction (IUGR) increases the morbidity and mortality of neonates, which is a major public health problem. Predictive factors such as hypertension, diabetes, coronary heart disease and stroke may adversely risk for the intrauterine environment. The study aimed to estimate IUGR with various risk factors.

Methods: A cross-sectional study was conducted in the period from the 15th of May to the 31st of October 2019. All newborn babies with a birth weight of less than 2.5 Kg were enrolled. In addition, Ponderal index values [PI] are used as a predictor for IUGR diagnosis in a neonate.

Results: Fifty newborns were admitted, 22 were male and 28 were female. Moreover, 10 neonates were full terms and 40 preterms. AGA neonates were 6 males and 4 females, whereas IUGR were 16 males and 24 females. Most AGA cases belonged to small age groups, while neonates with IUGR were categorized as large age groups with a high statistical difference (P=0.012). NVD was the most way of delivery with 8 cases in the AGA group, and 25 cases in the IUGR group. Multigravidas reported lower in AGA cases than primigravidas cases (6 vs. 4), in addition, the same for IUGR newborns (21 vs. 19). Regarding maternal age, AGA cases are not different between women aged <18 years and >18 years. However, IUGR cases are more recorded in ages below 18 years. Maternal and DM were insignificantly different between AGA and IUGR neonates. RDS was more reported in IUGR than AGA (27 cases vs. 7 cases). Moreover, IUGR cases with hypoglycemia were more than AGA (12 vs. 8), which was statistically significant (P=0.003). Hypothermia and jaundice are insignificantly different between AGA and IUGR.

Conclusions: Female gender is a predisposing factor to develop IUGR more than AGA. The more mature pregnancy the higher the incidence of IUGR. NVD, parity, maternal age, maternal and DM are insignificantly different between AGA and IUGR. RDS, hypothermia and jaundice are insignificantly different between AGA and IUGR. However, hypoglycemia is more liable in IUGR than AGA.

Keywords: IUGR; AGA; Prematurity; Neonatology; Preterm

Introduction

More than 30 million live births per year are delivered with intrauterine growth restriction (IUGR) in most developing countries. IUGR is defined as the newborn baby is unable to reach it is genetically predetermined growth potential. However, small for gestational age infants (SGA) are those with body weights are less than the 10th percentile for their gestational age, hence they can grow appropriately thereafter and often mature neurologically. IUGR babies had body weights less than the 10th percentile for their gestational age but were predisposed to many complications, including perinatal asphyxia, meconium aspiration and hypoglycemia [1]. The usual method of detecting a newborn as being below 2.5 Kg, does not distinguish between smallness due to prematurity (less than 37 weeks of gestation) and smallness due to IUGR. Several factors affect the fetal growth and birth weight rather than the gestational age, these include maternal (parity, height, weight, and ethnicity) and fetal gender [2], maternal diabetes or hypertensive diseases, antepartum hemorrhage, placental insufficiency, cigarette smoking, alcohol consumption, and social deprivation [3]. There are two categories of IUGR babies symmetrical IUGR (head circumference, length and weight equally affected) or asymmetrical IUGR (both weights and length are affected equally while relatively head growth sparing growth restriction). The etiology of symmetric IUGR are genetic, teratogenic, chromosomal, intrauterine infections and severe hypertensive etiologies, while asymmetric IUGR is associated with maternal vascular disease (pre-eclampsia, and hypertension) or with insufficient maternal nutrition and dietary support causes fetal hypoplasia [4]. Neonatal morbidity and mortality increased in IUGR babies and reflect a major public health problem [5]. The prognosis is poor, and may develop in the future sequel of hypertension, diabetes, coronary heart disease, and stroke [6].

Methods

A cross-sectional study was conducted in the neonatal intensive care unit in the period from the 15th of May to the 31st of October 2019. All

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newborn babies with a birth weight of less than 2.5 Kg were enrolled. Data collection includes the gestational age, gender, age of mother, parity, delivery mode, maternal hypertension, and DM. In addition, Ponderal index values [PI] were used as a predictor for IUGR diagnosis in a neonate; we regarded neonates with PI < 2.25 for the term and < 2 for preterm as growth restricted.

Results

Fifty newborns were admitted, 22 were male and 28 were female. Moreover, 10 neonates were full terms and 40 preterms (Table 1).

Table 1: Study variables.

	No. (%)	Variables
Gender	22 (44)	Male
	28 (56)	female
Maturity	10 (20)	Full term
	40 (80)	Preterm

AGA neonates were 6 males and 4 females, whereas IUGR were 16 males and 24 females with no significant difference (P=0.25). Most AGA cases belonged to small age groups, while neonates with IUGR were categorized as large age groups with a high statistical difference (P=0.012). NVD was the most way of delivery with 8 cases in the AGA group, and 25 cases in the IUGR group, with no significant difference (P=0.29). Multigravidas reported lower in AGA cases than primigravidas cases (6 vs. 4), in addition, the same for IUGR newborns (21 vs. 19), with no significant difference (P=0.67). Regarding maternal age, AGA cases are not different between women aged <18 years and >18 years. However, IUGR cases are more recorded in ages below 18 years. There was no significant difference (P=0.232). Maternal and DM are insignificantly different between AGA and IUGR neonates (P=0.886; P=0.296), respectively. RDS was more reported in IUGR than AGA (27 cases vs. 7 cases) without any significant difference (P=0.879). Moreover, IUGR cases with hypoglycemia were more than AGA (12 vs. 8), which was statistically significant (P=0.003). Hypothermia and jaundice are insignificantly different between AGA and IUGR (P=1) (Table 2).

Table 2: Variables of the study correlation.

Variables		AGA (n=10)	IUGR (n=40)	P value
		No.		
Male	Gender	6	16	0.25
Female		4	24	
28-35	Gestational age	7	11	0.012
36-42		3	29	
NVD	Delivery mode	8	25	0.29
CS		2	15	
Primigravidas	Parity	6	21	0.67
Multiparous		4	19	
≤18	Maternal age (years)	5	28	0.232
>18		5	12	
Yes	Maternal HT	4	17	0.886
No		6	23	
Yes	Maternal DM	2	15	0.296
No		8	25	
Yes	RDS	7	27	0.879
No		3	13	
Yes	Hypoglycemia	8	12	0.003
No		2	28	
Yes	Jaundice	6	30	0.344
No		4	10	
Yes	Hypothermia	2	8	1
No		8	32	

Discussion

The higher incidence of AGA and IUGR neonates may be related to the higher rate of premature and full-term delivery as most of these low birth weight newborns when adjusted for gestational age attributed to being preterm, which like the study of Piper JM, et al. (1996) [7].

In this study, 22 were male and 28 were female. Moreover, 10 neonates were full terms and 40 preterms. AGA neonates were 6 males and 4 females, whereas IUGR were 16 males and 24 females with no significant difference (P=0.25). These are indicated female gender fragility and vulnerability to different hazards that necessitate NICU admission. The male predominance in a study in the USA [8] while Melamed N, et al. (2010) [9], the study reported female predominance.

Most of the AGA cases belonged to small age groups, while neonates with IUGR were categorized as large age groups with a high statistical difference (P=0.012). As the birth weight of premature babies is normally less than 2.5 Kg, therefor, neonates with low birth weight after adjustment for gestational age, most of them are premature and categorized in the AGA group which explains the higher incidence of AGA. While the IUGR

group's higher incidence in large age category period is explained by the fact that birth weight <2.5 Kg in this gestational age period is usually pathological and may indicate IUGR, this finding agreed with other studies [7,10].

NVD was the most way of delivery with 8 cases in the AGA group, and 25 cases in the IUGR group, with no significant difference (P=0.29). Vaginal delivery is further higher among AGA than IUGR neonates, and this kind of distribution applied simultaneously to CS delivery in which the higher rate for AGA over the IUGR group. The data dislike the findings of the Sweden study [11].

Multigravidas reported lower in AGA cases than primigravidas cases, in addition, the same for IUGR newborns (P=0.67). Regarding maternal age, AGA cases are not different between women aged <18 years and >18 years. However, IUGR cases are more recorded in ages below 18 years. In the review of previous literature, the authors did not mention the number of children delivered and maternal age with IUGR and AGA.

Maternal HT and DM are insignificantly different between AGA and IUGR neonates (P=0.886; P=0.296), respectively. This means maternal HT and DM hurt IUGR, but are of no statistically significant value, and this is agreed with a study in South America [12].

RDS was more reported in IUGR than AGA (27 cases vs. 7 cases) without any significant difference (P=0.879). Moreover, IUGR cases with hypoglycemia were more than AGA (12 vs. 8), which was statistically significant (P=0.003). Hypothermia and jaundice are insignificantly different between AGA and IUGR (P=1). These higher incidences in the IUGR group were attributed to pulmonary dysfunction, which proportioned diversely with reduction of birth weight (lower birth weight percentile <10th percentile by definition of IUGR) which is supported by another study [7,10, and 13]. Also, the results agree with [14,15], and disagree with others [16-18].

The pathogenesis beyond predisposes IUGR neonates to hypoglycemia, including failure to maintain normal glycogenolysis, gluconeogenesis, ketogenesis, reduced adipose tissue stores, and hyperinsulinism. The severity of symptoms is diversely proportioned to the gestational age at delivery [14-16,19].

Conclusions

The female gender is a predisposing factor to develop IUGR more than AGA. The more mature pregnancy the higher the incidence of IUGR. NVD, parity, maternal age, maternal, and DM are insignificantly different between AGA and IUGR. RDS, hypothermia and jaundice are insignificantly different between AGA and IUGR. However, hypoglycemia is more liable in IUGR than AGA.

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