

## Evaluation of Sildenafil Citrate Use in Cases of Intrauterine Growth Restriction

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Conflict of interest: Nil

**Abstract:**

**Background:** Intrauterine growth restriction (IUGR) is one of the most serious complications of pregnancy. Up to date, there is no evidence of achieving antenatal treatment of IUGR with abnormal placentation. Although, Sildenafil citrate has shown promising results, there is no firm conclusion till now. The aim of our study is to evaluate the use of Sildenafil citrate in the treatment of IUGR cases associated with impaired placental circulation.

**Methods:** This was a prospective non-randomized study conducted at JLNMC, Bhagalpur, Bihar, starting from February 2019 to January 2020. The studied population included singleton pregnancy and suffering from IUGR associated with impaired placental circulation.

**Results:** This study included 30 pregnant women. Cases were divided into two groups. The first group received sildenafil citrate and the second control group did not receive sildenafil citrate. After 4 weeks after the 1st dose of Sildenafil significant decrease in umbilical artery Doppler indices. There was a statistically significant difference in the mean birth weight at delivery and neonatal admission to the NICU in sildenafil group.

**Conclusion:** Sildenafil citrate treatment may present a new hope towards better perinatal outcomes for pregnancies complicated by IUGR and impaired placental circulation that may help to decrease neonatal admission to the NICU.

**Keywords:** IUGR, NICU, Doppler.

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**Introduction**

One of the major complications of pregnancy, intrauterine growth restriction (IUGR) is commonly caused by abnormal placentation and impaired placental blood circulation. The trophoblast releases nitric oxide (NO) in normal pregnancy, which is a potent vasodilator. However, decreased release of NO may be present in pregnancies complicated by preeclampsia or IUGR. Drugs increasing the effect of NO may be possible therapeutic agents for IUGR. Sildenafil citrate acts by blocking phosphodiesterase5 inhibitor that breaks down cGMP, consequently, mediating the vasodilator effects of NO. This study was undertaken to evaluate the benefits of sildenafil citrate in cases of intra uterine growth restriction.

**Materials and Methods**

This study included 30 pregnant women with gestational age between 24 and 32 weeks having singleton pregnancy and suffering from IUGR attending the antenatal clinic. This was a

prospective non-randomized study conducted at Jawaharlal Nehru Medical College & Hospital, Bhagalpur, Bihar from February 2019 to January 2020.

**Inclusion Criteria:**

- Pregnant women with single fetus with IUGR
- Age 19 to 45
- Patients with regular menstrual pattern before pregnancy
- Patients are able to attend follow up as planned.

**Exclusion Criteria:**

- Patients with uncertain GA
- Patients with known or suspected fetal anomalies
- Patients with obstetrical complications (intrauterine infection, bleeding, premature rupture of membranes)
- When urgent delivery is indicated

- Usage of any vasodilator medication
- Multiple pregnancies.
- Smoking, drug or alcohol abusers

The diagnosis of IUGR was based on clinical suspicion (history and examination) confirmed by ultrasound diagnosis: less than the 10th percentile fetal weight for corresponding GA or abdominal circumference (AC) less the 10th percentile value for corresponding GA with abnormal Umbilical artery (UA) Doppler indices. Sildenafil treatment was given after the diagnosis of IUGR pregnancy. Each participant received a 20 mg tablet of sildenafil citrate orally and if no significant side effects were recorded, the dose was increased to 20 mg sildenafil two, times daily until delivery. Patients refused the treatment or stopped it due to non-compliance or side effects in the first days of treatment were advised to stop it and were

considered the control group. Each patient was instructed for bed rest and nutritional supplementation including excessive oral fluid. Maternal outcome was noted in terms of 1. UA Doppler indices. 2. Maternal and fetal safety. 3. GA at delivery. 4. Birth weight. 5. Neonatal outcomes. The results were tabulated and data analysed as mean, range, standard deviation and frequencies.

### Results

This study included 30 pregnant women with GA between 24 and 32 weeks. Cases were divided into two groups. The first group received sildenafil citrate and the second control group did not receive sildenafil citrate. Maternal baseline characteristics revealed that the mean of the age, body mass index (BMI) and GA at the start of treatment in sildenafil group and control group showed no significant difference (Table 1).

**Table 1 : Baseline characteristics**

Characteristics	Sildenafil Group (n=15)	Control Group (n=15)	p-value
Age (Inyears)	27.3±7.5(18-40)	28.7±6(18-40)	0.484
BMI (kg/m <sup>2</sup> )	28.5±5.9(21.5-40.1)	26.9±5.1(20.2-39.3)	0.301
G.A.at start (week)	27.4±1.6(25-31)	28.1±1.5(26-32)	0.223

UA Doppler indices between studied groups at the start of treatment showed no significant difference. After 4 weeks of the 1st dose of sildenafil, there was a significant decrease in the S/D ratio in sildenafil group, compared to control group. There was also a significant decrease in (RI) and (PI) in sildenafil group, compared to control group (Table 2).

**Table 2: Umbilical artery Doppler in indices at baseline and 4weeks after 1<sup>st</sup> dose of sildenafil**

Umbilical artery Doppler at baseline					Umbilical Doppler indices 4 weeks after 1 <sup>st</sup> dose od sildenafil				
N	Sildenafil group N=15	Control Group N=15	t	p	N	Sildenafil group N=15	Control Group N=15	t	p
N	Sildenafil group N=15	Control Group N=15	t	p	N	Sildenafil group N=15	Control Group N=15	t	p
S/D	4.5±0.1 (4.4-4.7)	4.6±0.2 (4.4-4.74)	0.96	0.337	S/D	4.3±0.09 (4.2-4.6)	4.6±0.11 (4.4-4.8)	7.2	<0.001
RI	0.78±0.02 (0.75-0.84)	0.759±0.02 (0.75-0.84)	1.12	0.266	RI	0.75±0.02 (0.72-0.80)	0.81±0.02 (0.78-0.85)	9.11	<0.001

The mean GA at delivery in sildenafil group (35.3 weeks) was higher than that of the control group (34.8 weeks) with no significant difference. There was a statistically significant difference in the mean birth weight at delivery; it was 2066.8 gm in sildenafil group compared to 1732.8 gm in control group (Table 3). Live birth was encountered in 14 cases in sildenafil group and 12 cases in the control group. Still birth was encountered in one case in sildenafil group and 3 cases in the control group.

There were no apparent causes of stillbirth, such as congenital anomalies or hydrops or sign of infection. All live births delivered by cesarean section in both groups. Apgar score at 5 min were significantly increased in sildenafil group. Neonatal deaths were encountered in one case in sildenafil group and 3 cases in the control group. 4 of neonates in sildenafil group and 9 of neonates in control group were admitted to the newborn nursery (Table 3).

**Table 3 : Peripartum Characteristics and Neonatal Outcome**

	Sildenafil group [n=15]	Control group [n=15]	P value
G.A at delivery (weeks) Mean±SD (Range)	35.3±1.8(30-38)	34.8±1.9(31-38]	0.359
Birth weight (gm) Mean±SD (Range)	2066.8±351.6 (1200-2800)	1732.8±360.8 (1000-2300)	0.002
Live birth Number-percentage	14-93	12-80	0.305
Stillbirth Number-percentage	1-6	3-20	0.305

Neonatal death Number-percentage	1-6	3-20	0.305
Apgar score at 5min Mean±SD	6.2±2.2	3.7±2.3	<0.001
Admission to newborn nursery Number-percentage	4-26	9-60	0.023

## Discussion

The standard options for management of IUGR are expectant management till pregnancy termination. This involves modification of maternal lifestyle together with fetal surveillance. Since impaired placental circulation is a major cause, vasodilators may have their role. Sildenafil citrate started was emerged as a drug helping vasodilation. The decreased vascular resistance after sildenafil administration that we have encountered in our study was evident by the significant decrease in Doppler indices. Comparable results were recorded by Panda et al., and Lin et al., in their case reports. The same results were recorded from randomized controlled trials done by El-Sayed et al., Trapani et al., and Dastjerdi et al. Regarding Maternal safety of sildenafil citrate, Headache was the commonest side effect followed by visual disturbance and gastrointestinal tract symptoms. Overall Sildenafil was well tolerated. These findings were similar to that reported by of Dunn et al.

## Conclusion

In conclusion, sildenafil citrate treatment may present a new hope towards better perinatal outcomes for pregnancies complicated by IUGR that may help to decrease neonatal admission to NICU. Mean birth weight at delivery was increased significantly in sildenafil group. Apgar score at 5 min. were significantly increased in sildenafil group. Safe for mother and fetus with improving effect on IUGR.

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