

# Study of placental and birth weight ratio and its effect on perinatal outcome

Syeda Uzma Fatima<sup>1</sup>, Shubhangi Mande<sup>2\*</sup>, Lakshmi Rachakonda<sup>3</sup>

Department of Obstetrics and Gynecology, MGM Medical College and Hospital, Aurangabad, Maharashtra, INDIA.

Email: [pramod.bhale@gmail.com](mailto:pramod.bhale@gmail.com)

## Abstract

**Background:** The Placenta is a dynamic organ, and plays a vital role in normal fetal development. The high placental weight /birth weight ratio was found to be associated with increased risk in hypertension in adulthood coronary heart disease, cardiovascular mortality and impaired glucose tolerance. **Aim and Objectives:** Aim: To study the range of placental weight and its ratio with neonatal birth weight. To study the relationship between placental weight and neonatal outcome. **Objectives:** To quantify placental weight and its ratio to the birth weight and to determine whether the abnormal placental weight and its ratio are associated with adverse pregnancy outcomes. **Material and Methods:** A prospective cross-sectional study was conducted during April 2018 to June 2018 in *Department of obstetrics and Gynaecology, MGM medical college and hospital Aurangabad.* **Results:** In present study duration 500 pregnant women were enrolled. The mean age of present study women was 24.67 with standard deviation of 4.23 years. The mean Placental weight and birth weight ratio of with mother babies was 20.26 was lesser as compared to NICU admitted babies 24.58 and IUD babies i.e. 21.50. The mean Placental weight and birth weight ratio difference in Neonatal Outcome was found to be statistically significant ( $p < 0.0001$ ). The mean birth weight, Placental weight and Placental weight and birth weight ratio of male babies was higher than that of their female. **Conclusion:** The significant increased risk for adverse neonatal outcome in newborns with high PW/BW ratios. ICU admission rate followed a trend where it was increased in the high PW/ BW ratio. The PW/BW ratio may provide as an easy clinical marker for short-term adverse obstetric outcomes.

**Key Words:** Placental weight and birth weight Ratio, adverse neonatal outcome.

## \*Address for Correspondence:

Dr. Shubhangi Mande, Department of Obstetrics and Gynecology, MGM Medical College and Hospital, Aurangabad, Maharashtra, INDIA.

Email: [pramod.bhale@gmail.com](mailto:pramod.bhale@gmail.com)

Received Date: 23/09/2018 Revised Date: 14/10/2018 Accepted Date: 01/11/2018

DOI: <https://doi.org/10.26611/1012827>

## Access this article online

Quick Response Code:



Website:

[www.medpulse.in](http://www.medpulse.in)

Accessed Date:  
12 November 2018

## INTRODUCTION

The Placenta is a dynamic organ, and plays a vital role in normal fetal development<sup>1</sup>. The ability of fetus to grow and thrive in utero depends on the placental function, the average weight of placenta at term is 508 grams<sup>1,2</sup>. The ratio between the placenta and newborn birth weight has been reported as 1:6<sup>3</sup>. The high placental weight /birth

weight ratio was found to be associated with increased risk in hypertension in adulthood coronary heart disease, cardiovascular mortality and impaired glucose tolerance. Barker *et al* reported that altered growth of the placenta was a predictor of maternal diseases including cardiovascular diseases, hypertension and diabetes mellitus<sup>4</sup>. Other factors such as race and socioeconomic status also affect the placental weight<sup>5</sup>. The placental weight (PW) is closely associated with the birth weight<sup>6</sup>, and their ratio (F/P), which is often used as an index of placental nutrient efficiency, has been discussed in relation to adverse perinatal outcomes, such as perinatal death, non-reassuring fetal status and low Apgar scores<sup>7</sup>. So in this present study we will observe the *Placental and Birth Weight Ratio and Its effect on Perinatal outcome*.

**How to cite this article:** Syeda Uzma Fatima, Shubhangi Mande, Lakshmi Rachakonda. Study of placental and birth weight ratio and its effect on perinatal outcome. *MedPulse – International Journal of Gynaecology*. November 2018; 8(2): 69-73.  
<http://medpulse.in/Gynaecology/index.php>

## AIM AND OBJECTIVES

**Aim:** To study the range of placental weight and its ratio with neonatal birth weight. To study the relationship between placental weight and neonatal outcome.

**Objectives:** To quantify placental weight and its ratio to the birth weight and to determine whether the abnormal placental weight and its ratio are associated with adverse pregnancy outcomes.

## MATERIALS AND METHODS

This study was a prospective cross-sectional study between 1st April 2018 to 30th June 2018 at MGM medical college and hospital.

All the placentae were measured on an infant weighing scale shortly after delivery with membranes and cord after removing obvious clots.

**Study Design:** A prospective cross-sectional study

**Study Period:** April 2018 to June 2018

**Place of study:** Department of obstetrics and Gynaecology, MGM medical college and hospital Aurangabad.

**Inclusion Criteria:** All women who delivered at term at MGM hospital Aurangabad.

**Exclusion Criteria:** Retained and adherent placentas. Placentas weight which were incorrectly weighed.

**Methodology:** The placenta of the mothers who delivered vaginally as well as by cesarean sections were prepared according to the method of placental preparation as described in the following manner. An accurate weighing of the placentas was done by trimming off all membranes and severing the umbilical cord at the insertion site on the placenta surface. Superficial fetal vessels were drained of all blood. Adherent blood clots were removed from the maternal surface. The placenta was weighed on a calibrated digital device to the nearest gram. The weights were recorded. The weighing was accomplished within one hour after delivery. The birth weight of newborns was recorded to the nearest gram on electronic weighing machine immediately after delivery. Ratio of PW and BW multiplied by 100 was *calculated* for PW/BW ratios.

**Statistical Analysis:** The collected data was compiled in MS Excel sheet 2007, The analysis of this data was done using the SPSS version 24 for window. ANOVA was used to find the significance of placental weight/ birth weight ratio with perinatal outcome. Also Unpaired t-test was applied. P-value was check at 5% level of Significance.

## OBSERVATIONS AND RESULTS

In present study duration 500 pregnant women were enrolled. The mean age of present study women was 24.67 with standard deviation of 4.23 years.

**Table 1: Maternal characteristics and perinatal outcome**

Particular	Number [N=500]	%	
Age-Group	<19	33	6.6%
	19-35	451	90.2%
	>35	16	3.2%
Booking status	Booked	267	53.4%
	Unbooked	233	46.6%
Mode of Delivery	Vaginal	300	60.0%
	LSCS	198	39.6%
	Instrumental	2	0.4%
Obstetric History	Primi	220	44.0%
	Multi	280	56.0%
Neonatal Outcome of babies	With Mother	428	85.6%
Outcome of babies	NICU	55	11.0%
	IUD	17	3.4%
Babies Gender	Male	292	58.4%
	Female	208	41.6%

The age distribution of the women studied were as follows: 97.2% of them were in the age group of 19 to 35 years of age. 6.6% of them were teenagers and only 3.2% of them were above 35 years of age. Out of 500 women, 267 (53.4%) women were booked and 233 (46.6%) were unbooked. In present study majority of 300 (60.0%) delivery were Vaginal, 198 (39.6%) were LSCS and 02(0.4%) were instrumental. Out of 500 mothers, 280 (56.0%) were Mult gravida and 220 (44.0%) were primi gravida. 55 (11.0%) neonates required NICU admission and 17 (3.4%) neonates reported IUD. 292 (58.4%) mother delivered male babies and 208 (41.6%) mother delivered female babies.

**Table 2: Associated disorders in mothers**

Associated disorder	Number	%
Anemia	182	36.4%
DM	4	0.8%
PIH	16	3.2%
Thyroid Disorder	5	1%
Oligo	34	6.8%
Poly	2	0.4%
Placenta Previa	3	0.6%
Abruptio Placenta	2	0.4%

Out of 500 mothers, maximum 182(36.4%) mothers were anemic, 34(6.8%) were Oligo, 16(3.2%) mothers observed PIH, 5(1.0%) of mothers suffered from thyroid disorder, 04(0.8%) mother were diabetic. Whereas 3(0.6%), 02(0.4%) and 02(0.4%) mothers suffered from associated disorder Placenta Previa, poly and Abruptio Placenta respectively.

**Table 3:** Comparison of Mean Birth weight in (gm) and in Neonateal Outcome

Neonateal Outcome	N	Mean ±SD	95% Confidence Interval for Mean		F-value	P-value
			Lower Bound	Upper Bound		
With Mother	428	2720.1±410.9	2680.96	2759.05	36.74	P<0.0001 S
NICU	55	2209.1±840.8	1981.80	2436.41		
IUD	17	2082.6±901.5	1619.06	2546.11		

The mean birth weight of with mother babies was 2720.1 gm was higher as compared to NICU admitted babies was 2209.1 gm and IUD babies i.e.2082.6 gm. The mean birth weight difference in Neonatal Outcome was found to be statistically significant (p<0.0001).

**Table 4:** Comparison of Mean Weight of Placental (gm) in Neonateal Outcome

Neonateal Outcome	N	Mean ±SD	95% Confidence Interval for Mean		F-value	P-value
			Lower Bound	Upper Bound		
With Mother	428	543.74±95.03	534.71	552.77	25.78	P<0.0001 S
NICU	55	479.54±115.6	448.29	510.79		
IUD	17	400.58±131.9	332.77	468.39		

The mean Placental weight of with mother babies was 543.74 gm was higher as compared to NICU admitted babies 479.54 gm and IUD babies i.e. 400.58 gm. The mean Placental weight difference in Neonatal Outcome was found to be statistically significant (p<0.0001).

**Table 5:** Comparison of Mean Placental weight and birth weight ratio in Neonateal Outcome

Neonateal Outcome	N	Mean ±SD	95% Confidence Interval for Mean		F-value	P-value
			Lower Bound	Upper Bound		
With Mother	428	20.26±3.89	19.89	20.64	15.38	P<0.0001 S
NICU	55	24.58±10.91	21.62	27.53		
IUD	17	21.50±10.80	15.94	27.05		

The Mean Placental weight and birth weight ratio of with mother babies was 20.26 was lesser as compared to NICU admitted babies 24.58 and IUD babies i.e. 21.50. The Mean Placental weight and birth weight ratio difference in Neonatal Outcome was found to be statistically significant (p<0.0001).

**Table 6:** Comparison of mean Birth weight, Placental Weight and Placental weight and birth weight ratio

Gender	Birth weight	Placental Weight	Placental weight and birth weight ratio
	Mean±SD	Mean±SD	Mean±SD
Male	2645.99±545.81	539.57±104.61	21.10±0.33
Female	2639.14±514.63	520.91±101.52	20.10±0.31
t-value	0.107	1.99	2.10
P-value	P=0.915 NS	P=0.047 S	P=0.036 S

The mean birth weight of male babies (2645.14 g) was higher than that of their female counterpart (2639.14 g). However, it was not statistically significant (P>0.05). The mean placental weight of male babies (539.57 g) was higher than that of their female babies (520.91 g) this mean difference was statistically significant (P=0.047). The mean Placental weight and birth weight ratio of male babies (21.10) was higher than that of female babies (20.10) this mean difference was found to be statistically significant (P=0.036).

**Table 7:** Comparison of mean Birth weight, Placental Weight and Placental weight and birth weight ratio in associated disorder

Associated disorder	Number	Birth weight	Placental Weight	Placental weight and birth weight ratio
		Mean±SD	Mean±SD	Mean±SD
Anemia	182	2606.9±502.56	548.94±72.99	20.80±5.14
DM	4	3040.83±369.06	612.50±128.05	20.00±2.54
PIH	16	2370.31±791.03	472.81±122.17	21.58±8.67
Thyroid Disorder	5	2590.00±320.96	473.00±86.43	18.22±1.97
Oligo	34	2667.31±523.11	467.79±123.44	20.59±4.37
Poly	2	2640.58±532.37	480.00±91.65	17.24±5.61
Placenta Previa	3	2643.19±532.82	405.00±123.79	16.24±2.58
Abruptio Placenta	2	2644.71±531.13	250.00±70.71	12.66±0.94

The mean Birth weight i.e. 2370.31 gm was low in PIH women as compared with other associated disorder, The mean Placental Weight was recorded low in Abruptio Placenta i.e. 250.00 gm as compared with other associated disorder. Also Placental weight and birth weight ratio was recorded low in Abruptio Placenta i.e. 12.66.

## DISCUSSION

In this study, 500 delivered women were enrolled. Placental weight and birth weight of the neonate are widely available measures. The ratio of these two variables is a useful marker for perinatal outcome. *The mean age of women in present study was 24.67 with standard deviation of 4.23 years similar age was noted by Abubakar A. Panti et al<sup>8</sup>. Also similar age-range was reported by Bonds D. R. et al<sup>9</sup> and Perry I. J. et al<sup>10</sup>. In this study 267(53.4%) women were booked whereas study done by Abubakar A. Panti et al<sup>8</sup> noted more number of booked women (90%). In this study 11% of neonates admitted to NICU, 3.4% neonates reported IUD and 85.6% were with mother these findings were similar to study conducted by Salih, SH.A.<sup>1</sup>. The mean placental weight was 531.81 with SD of 103.6. Also in a research done by Peter Kwabina in Ghana they found that the mean placental weight is 613 grams (SD±123.8 grams) with a range of 319- 1266 grams<sup>11</sup>. When comparing our result with other different researches will be confusing due to different types of placenta preparation and storage, however several studies reported that the mean of human placental weight was ranging from 438gm to 680gm<sup>12,13,14,15</sup>. The mean birth weight of with mother babies was 2720.1 gm was higher as compared to NICU admitted babies was 2209.1 gm and IUD babies i.e.2082.6 gm. The mean birth weight difference in Neonatal Outcome was found to be statistically significant ( $p<0.0001$ ). *Similar findings was noted by Salih, SH.A.<sup>1</sup> The Mean Placental weight and birth weight ratio of with mother babies was 20.26 was lesser as compared to NICU admitted babies 24.58 and IUD babies i.e. 21.50. The Mean Placental weight and birth weight ratio difference in Neonatal Outcome was found to be statistically significant ( $p<0.0001$ ). So from these findings we can noted that there was a significant increased risk for adverse neonatal outcome in newborns with high PW/BW ratios<sup>16</sup>. ICU admission rate followed a trend where it was increased in the high PW/ BW ratio and was decreased in the low PW/BW ratio group.**

## CONCLUSION

From this study it can be concluded that the significant increased risk for adverse neonatal outcome in newborns with high Placental weight and birth weight ratios. ICU

admission rate followed a trend where it was increased in the high Placental weight and birth weight ratio. The Placental weight and birth weight ratio may provide as an easy clinical marker for short-term adverse obstetric outcomes. Because of the calculation of Placental weight and birth weight ratio is easy and simple. So it can be practiced at primary health centres in rural area.

## REFERENCES

1. Salih, SH.A and Omar, A.M: The Relationship Between The Weight Of The Placenta And Neonatal Outcome: IOSR Journal of Nursing and Health Science (IOSR-JNHS), 2017, 6 (6), 01-08
2. Wallace JM, Bhattacharya S, Horgan GW. Gestational age, gender and parity specific centile charts for placental weight for singleton deliveries in Aberdeen, UK. *Placenta*. 2013; 30:269-274.
3. Cunningham FG, Leveno KJ, Bloom SL, Hauth JC, Gilstrap LC III, Wenstrom KD. Implantation, embryogenesis and placental development. In : Williams obstetrics 22nd ed. Newyork :Mc Graw –Hill; 2005:39-90
4. Barker DJ, Bull AR, Osmond C, Simmonds SJ. Fetal and placental size and risk of hypertension in adult life. *BMJ*. 1990;301:259–62.
5. Perry IJ, Beevers DG, Whincup PH, Bareford D. Predictor of ratio of placental weight to fetal weight in multiethnic community. *BMJ*. 1995; 310:436–9.
6. Yoshio Matsuda, Masaki Ogawa, Akihito Nakai, Masako Hayashi, Shoji Satoh, Shigeki Matsubara: Fetal/Placental Weight Ratio in Term Japanese Pregnancy: Its Difference Among Gender, Parity, and Infant Growth *J Med Sci* 2015; 12(4):301-305
7. Annama Jacob. *Comprehensive Textbook of Midwifery*. Jaypee Brothers; 2010: 388.
8. Abubakar A. Panti, Bissala A. Ekele, Emmanuel I. Nwobodo and Ahmed Yakubu: The relationship between the weight of the placenta and birth weight of the neonate in a Nigerian Hospital: *Niger Med J*. 2012 Apr-Jun; 53(2): 80–84.
9. Bonds DR, Gabbe SG, Kumar S, Taylor T. Foetal weight/placental weight ratio and perinatal outcome. *Am J Obstet Gynecol*. 1984; 149:195–200.
10. Perry IJ, Beevers DG, Whincup PH, Bareford D. Predictor of ratio of placental weight to fetal weight in multiethnic community. *BMJ*. 1995;310:436–9
11. Peter kwabinaappiah, Relationship between the morphology of the placenta, umbilical cord and perinatal outcome. Faculty of bioscience, university of science and technology. Ghana, 2009 available at [https://www.google.com/search?q=relationship between the morphology of the placenta, umbilical cord and perinatal outcome](https://www.google.com/search?q=relationship+between+the+morphology+of+the+placenta,+umbilical+cord+and+perinatal+outcome).
12. PH Daru, etal, Does the placental weight affect foetal outcome findings from central Nigeria. *Tropical Journal of Obstetrics and Gynaecology*. 2006;189,51-78.
13. Rebecca N. Baergen, MD; *The Placenta as Witness*; New York Presbyterian Hospital, Weill-Cornell Medical Center, *Clinic Perinatology* 34 (2007) 393–407.
14. Lackman F, Capewell V, Gagnon R, Richardson B. Fetal umbilical cord oxygen values and birth to placental

- weight ratio in relation to size at birth. American journal of obstetrics and gynecology. 2001; 185(3):674-82.
15. Kingdom J, Huppertz B, Seaward G, Kaufmann P. Development of the placental villous tree and its consequences for fetal growth. European journal of obstetrics, gynecology, and reproductive biology. 2000; 92(1):35-43.
16. F Shehata,<sup>a</sup> I Levin,<sup>b</sup> A Shrim,<sup>a</sup> B Ata,<sup>a</sup> B Weisz,<sup>c</sup> R Gamzu,<sup>b</sup> B Almoga. Obstetrics and Gynecology Department, McGill University Health Centre, McGill University, 687 Pine Avenue. Placenta/birthweight ratio and perinatal outcome: a retrospective cohort analysis. West, Montreal, QC H3A 1A1, Canada. Accepted 16 December 2010. Published Online 18 February 2011.

Source of Support: None Declared  
Conflict of Interest: None Declared

