

# A STUDY OF FOETAL WEIGHT/PLACENTAL WEIGHT RATIO IN RELATION TO PERINATAL OUTCOME

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## SUMMARY

High foetal weight placental weight ratio is associated with increased incidence of intrapartum foetal distress and increased perinatal problems. The relationship of placental size to perinatal outcome was investigated in 150 cases who delivered at term. The weight of the trimmed and drained placenta was recorded and its relationship to foetal weight was observed, in cases with or without perinatal problems with foetal weight/placental weight ratio from 5.9 to 6.9 only 1.52% infants had perinatal problems, whereas with foetal weight placental weight ratio more than 11, 100% infants had intrapartum foetal distress and poor perinatal outcome.

The results suggest that there is a population of presumably low risk infants who are at increased risk because they have out grown their placentae.

## Introduction

The ability of foetus to grow and prosper in utero is a function of placental surface area available for the exchange of respiratory gases and nutrients (Bonds *et al*, 1984). Decreased placental surface area has been associated with poor perinatal outcome.

Weights of human placentae have been found to be linearly related to the placental surface area and therefore, can be used as

an accurate estimate of the surface area available for diffusional exchange (Adair and Thelander, 1925).

The average placenta at term weights about 500 gms with a foetal weight placental weight ratio of 1/6-1/7 (Devi, 1982). At a fixed gestational age the foetuses who are attached to placentae that are small in relation to their body size, with a high foetal weight/placental weight ratio, appear to be at increased risk. Therefore, ratio of foetal weight and placental weight may be useful in predicting the perinatal outcome.

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## Aims and Objectives

The aim of present study was to find out

Accepted for publication on 8-10-85.

significance of foetal weight/placental weight ratio in relation to perinatal outcome in the patients of normal and high-risk pregnancy.

weight/placental weight ratio in the subjects with or without foetal distress was statistically evaluated by Chi square test.

#### Material and Methods

This study was conducted in the Department of Obstetrics and Gynaecology, S.P. Medical College, Bikaner. Total number of cases studied were 150. Cases were selected randomly among the patients who delivered at term gestation. Out of these, 106 patients had uncomplicated pregnancy, 30 had high-risk pregnancy like pre-eclampsia, IUGR, anaemia etc, and 14 infants from those who showed physical evidence of cord compression, in an otherwise uncomplicated pregnancy.

At delivery maternal antepartum and intrapartum record was assessed, infant's birth weight in nearest grammes, condition of neonate including one and five minute Apgar score and weight of placenta were noted. Presence of a nuchal cord, meconium stained amniotic fluid and physical evidence of foetal distress were observed.

The method of placental preparation was that of Molteni *et al* (1979). The cord and membranes were trimmed off, superficial foetal vessels drained of blood and adherent blood clots were removed from the maternal surface. Placenta was then blotted on an absorbable cotton pad and then weighted to nearest gramme.

The difference in the frequency of foetal

#### Observation and Results

The number of cases studied were 150. Mean age was 22.6 years, mean parity was 1.59. 55.66% infants were males and 43.3% were females.

Table I shows mean values of foetal weight/placental weight ratio at term from infants in uncomplicated pregnancies. The mean foetal weight varied from 2576 to 3051 gms (from 38 to 42 weeks of gestation). The mean placental weight varied from 335 to 439 grammes. Mean foetal weight/placental weight varied from 6.94 to 7.81. Out of 106 infants, 4 infants who had foetal weight/placental weight ratio more than 11 revealed poor perinatal outcome.

Table II shows foetal weight and placental weight ratio in term complicated pregnancies. The mean foetal weight varied from 2447 to 3280 grammes and mean placental weight varied from 289 to 471 grammes.

As the foetal weight/placental weight ratio increased the incidence of perinatal problems are also high, the difference was statistically significant.

Table III shows the perinatal outcome in relation to foetal weight/placental weight ratio in pregnancies complicated with cord

TABLE I  
Foetal and Placental Weight and Foetal Weight Placental Weight Ratios in Term Uncomplicated Pregnancies

Weeks of gestation	No. of cases	Foetal weight in gms		Placental weight in gms		Mean foetal weight
		Mean ± SEM	Mean ± SEM	Mean ± SEM	Mean ± SEM	Mean placental wt
38	25	2576 ± 70.24	335 ± 12.41	7.68 (11.4 —5.5)		
39	20	2694 ± 48.29	344.73 ± 13.21	7.81 (10.6 —6.57)		
40	48	3051.25 ± 69.33	439.06 ± 11.47	6.94 ( 9.16—4.33)		
41	13	2892.30 ± 84.45	407.69 ± 12.48	7.09 ( 8.11—5.55)		

TABLE II  
Foetal and Placental Weight and Foetal Weight Placental Weight Ratio in Term Complicated Pregnancies

Weeks of gestation	No. of cases	Foetal weight in gms	Placental weight in gms	Mean foetal weight in gms'
		Mean $\pm$ SEM	Mean $\pm$ SEM	Mean placental wt.
38	17	2447.76 $\pm$ 62.98	289.11 $\pm$ 16.07	8.47 (12.09—5.77)
39	5	3280.00 $\pm$ 159.80	395.00 $\pm$ 27.91	8.30 (9.33—7)
40	8	3175.00 $\pm$ 167.13	471.00 $\pm$ 40.46	6.73 (10—5)

TABLE III  
Foetal and Placental Weight and Foetal Weight Placental Weight Ratio in Pregnancies Complicated by Cord Compression

Weeks of gestation	No. of cases	Foetal weight in gms	Placental weight in gms	Mean foetal weight
		Mean $\pm$ SEM	Mean $\pm$ SEM	Mean placental wt.
38	6	3025.00 $\pm$ 159.65	416.00 $\pm$ 16.73	7.26 (8.57—6.66)
39	5	2870.00 $\pm$ 118.21	420.00 $\pm$ 12.28	6.83 (7.5—6.75)
40	3	2533.33 $\pm$ 33.37	366.66 $\pm$ 33.37	6.90 (8.33—6.25)

compression. No statistically significant perinatal problems were encountered. The mean foetal weight varied from 2533 to 3025 grammes. Mean placental weight varied from 366 to 420 grammes.

Table IV shows relation of perinatal outcome and foetal weight/placental weight ratio in uncomplicated pregnancies, compli-

cated pregnancies, and pregnancy complicated by cord compression. In the infants with foetal weight placental weight ratio from 5.7 to 6.9 out of 57 cases only 6 infants (1.52%) had perinatal problems, whereas with foetal weight placental weight ratio from 7 to 10.9, 63 infants (73.25%) had poor perinatal outcome and with foetal weight placental weight ratio more than 11

TABLE IV  
Perinatal Outcome and Foetal Weight Placental Weight Ratio in Uncompleted Pregnancies, Complicated Pregnancies and Pregnancies Complicated with Cord Compression

	Foetal weight/placental weight ratios						X <sup>2</sup>	P
	5.7 to 6.9		7 to 10.9		11 & above			
	Number	%	Number	%	Number	%		
Total Number	57		86		7			
Foetal distress	1	1.75	33	38.37	2	28.57	15.95	.001 H. Sig.
Meconium stained amniotic fluid	2	3.51	14	16.27	3	42.85	11.15	.001 H. Sig.
Apgar Score < 6	0	0	10	11.62	5	71.42	35.89	.001 H. Sig.
Hyper bilirubinemia	3	5.26	6	6.97	2	28.51	5.19	.02 Sig.

(In F.W./P.W. ratio—11 two cases were having Foetal Distress with Meconium Stained amniotic fluid while three cases had foetal distress, meconium stained amniotic fluid and Apgar Score < 6).

out of 7 infants, all infants (100%) had perinatal problems.

### Discussion

This prospective study was devised to see the relationship of foetal weight/placental weight ratio to perinatal outcome.

In our study, it has been observed that those infants attached to heavier placentae (low foetal weight/placental weight ratio 5 to 7) showed no statistically significant incidence of perinatal problems when compared to the population of the infants with high foetal weight/placental weight ratio.

Those infants who were attached to lighter placentae (High foetal weight/placental weight ratio 100 greater) showed statistically significant incidence of foetal distress and poor perinatal outcome. The observations were in accordance with that of Molteni *et al* (1978) who demonstrated a statistically significant increase in depressed infants (Apgar score less than 6). When the foetal weight/placental weight ratio was greater than 10. Their observations suggested that a high foetal weight/placental weight ratio in infants at term may help to explain the occasional instances of severe foetal distress during labour in the absence of any maternal disease or intra uterine growth retardation.

Bonds *et al* (1984) have observed that incidence of perinatal problems was increased in those infants whose foetal weight/placental weight ratio was greater than 11.

### Conclusion

It has been concluded that at a fixed gestational age, foetuses who are attached to a placenta that is small in relation to their body size that is high foetal weight/placental weight ratio appear to be at increased risk in uncomplicated as well as complicated pregnancies. If placental and foetal size could be accurately determined in utero, the subgroup of infants, who were originally thought to be at low risk but who are at increased risk because of small placental size could be identified (Bonds *et al*, 1984).

### References

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