

Original research article

## Percentiles of Pregnancy Outcomes in Consanguineous Marriages

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### Abstract

**Background:** In Asian continent consanguineous marriages are very common, and consanguinity supports the homozygosis of recessive susceptibility gene variants and shall be used to investigate a recessive component in inheritance diseases. The knowledge of genetic contribution from maternal and paternal factors for healthy development of pregnancy outcomes is very essential. There is dearth of knowledge regarding the impact of consanguineous marriage on birth weight and placental growth. Hence, present study was conducted to assess the percentiles of birth weight and placental morphometry in consanguineous marriages.

**Materials and Method:** Study was conducted on 391 subjects in teaching hospital of North Karnataka, India for a period of six months. Ethical clearance was obtained. Data was collected by using standard pretested proforma. Percentiles of birth weight and placental morphometry in consanguineous and non consanguineous groups has been explained in table and box plots have been plotted.

**Result:** In non-consanguineous group 5<sup>th</sup> and 10<sup>th</sup> percentiles of birth weight were higher as compared to consanguineous group, after which there was no consistent relationship.

In consanguineous group, percentiles of placental weight were higher as compared to non-consanguineous group except 5<sup>th</sup> and 90<sup>th</sup> percentiles.

In consanguineous group 25<sup>th</sup> to 95<sup>th</sup> percentiles of the placental volume were higher as compared to non-consanguineous group whereas, opposite trends were observed in 5<sup>th</sup> and 10<sup>th</sup> percentiles.

In consanguineous group the percentiles of placental surface area were higher as compared to non-consanguineous group except in case of 50<sup>th</sup> percentile, where both are same (226 cm sq).

**Conclusion:** In both non-consanguineous and consanguineous group birth weight did not exhibit consistent relation. In consanguineous group, percentiles of placental weight and placental volume were higher as compared to non-consanguineous group, but the relation was not consistent. In consanguineous group the percentiles of placental surface area were higher as compared to non-consanguineous group except in case of 50<sup>th</sup> percentile.

**Key words:** Percentiles, placental weight, placental surface area, birth weight, consanguineous marriages.

## Introduction

Fetal growth is the result of multiple factors; genetic factors, maternal nutrition, maternal metabolism, endocrine factors and placental perfusion and function, also fetal factors such as fetal capacities to respond to nutrition available and growth regulatory factors<sup>1</sup>. Genetic factors and congenital anomalies are more influenced by consanguineous marriages. Consanguineous marriages are associated with an increased risk of autosomal recessive disorders and congenital anomalies in the newborn<sup>2,3</sup>.

Consanguineous marriages are a kind of interfamilial union, marriage is arranged between two blood-related individuals who are cousins or closer relations<sup>4,5</sup>.

To protect the culture, tradition, solidarity and property amongst the families, in many Middle Eastern, South and West Asian and Sub-Saharan African societies, consanguineous marriages are more common. Whereas, consanguineous marriages are less frequently observed in Europe, Australia, North-America and in some tribal populations<sup>2,6,7</sup>.

Many studies have reported the prevalence of consanguineous marriages between the first cousins ranges from 7% to 65%<sup>2,5,8</sup>.

Consanguineous marriage, is also one of predisposing factor for multifactorial complications, like obesity, cardiovascular disorders, diabetes, and also malignancies, which influence the reproductive outcomes<sup>8</sup>.

Consanguineous marriages are associated with higher rates of birth defects, as several single gene and multifactorial disease. Hence, consanguinity is inferred with highest preterm birth, low birth weight, congenital malformations like bronchial asthma, heart diseases, sickle cell anemia and also preterm mortality due to involvement of recessive mode of inheritance<sup>9,10</sup>.

Many studies have assessed the effects of maternal socio-demographic and clinical factors on birth weight. There is an area specific literature paucity regarding the influence of consanguineous marriages on the placental morphometry (i.e weight, volume, surface area and thickness) and birth weight. Hence present study attempts to address the lacuna and to evaluate the effect of consanguineous marriages, on the percentiles of placental morphometry and birth weight.

## Materials and Methods

This study was conducted on 391 placentae of consecutive deliveries from Obstetrics and Gynecology Unit of Teaching Hospital from North Karnataka, India, for period of six months. The approval of the institutional ethics clearance committee was obtained. Informed and written consent was obtained from the subjects.

Study includes mothers with consecutive singleton deliveries of gestational age 28 weeks and above. The subjects without antenatal checkup during first trimester and with history of prepregnancy systemic and chronic diseases were excluded.

The history of consanguineous and non consanguineous marriages, placental morphometry, and newborn weight were recorded on a predesigned and pretested pro forma.

## Methods

Placental Morphometry was assessed as specimen Collection, Preparation, and Assessment of

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- Placentae were collected soon after separating the baby from the umbilical cord. The collected placentae were examined thoroughly and washed under running tap water, thereafter, membranes were trimmed and stored in 10% formalin

- The weight of each placenta was determined by using a digital baby weighing scale (CS-8316; CE certified) and recorded with accuracy of 1 g.
- The maternal surface area of the placenta was calculated using the following formula: Surface area=  $p \times dl \times ds/4$ , (where dl is the largest diameter and ds is the smallest diameter)  
The surface area was recorded with accuracy of 1 cm<sup>2</sup>.
- The volume was recorded using water displacement method, with accuracy of 1 ml.

#### Parameters of Mother Assessed

Information regarding the consanguineous marriages of mothers were recorded from in-patient records. Mothers were classified into 2 groups-

1. Consanguineous marriages
2. Non consanguineous marriages

#### Parameters of Newborn Assessed

Gestational age, Birth weight of the newborn.

Birth weight was measured by using the digital baby weighing scale (CS-8316; CE certified) with an accuracy of 10 g.

Statistical analysis was carried out using SPSS, version 16.

Percentiles of birth weight and placental morphometry have been studied by consanguineous marriage and non-consanguineous groups. Box plots were prepared to study the relative distributions of placental morphometry and birth weight in different groups of consanguineous and non-consanguineous marriages.

## Results

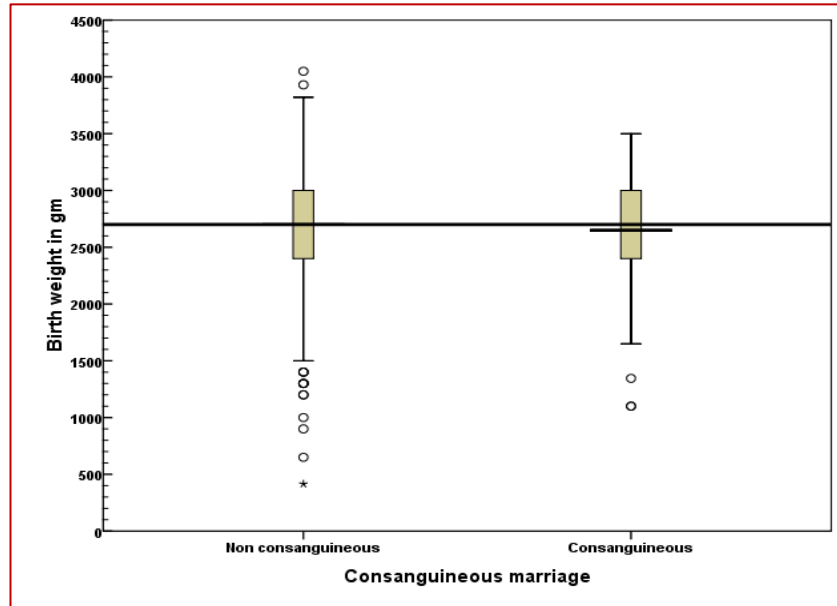
**Table 1: Percentiles of birth weight and placental morphometry by consanguineous marriage**

Consanguinity	Percent (n=391)	Percentiles						
		5	10	25	50	75	90	95
<b>a. Birth weight</b>								
Non-consanguineous	89.8	1700	2065	2400	2700	3000	3200	3462
Consanguineous	10.2	1112	1695	2400	2650	3000	3200	3456
<b>b. Placental weight</b>								
Non- consanguineous	89.8	285.8	314.5	375.0	436.0	501.3	575.5	593.3
Consanguineous	10.2	235.3	340.6	388.5	469.0	514.3	574.9	631.8
<b>c. Placental volume</b>								
Non- consanguineous	89.8	240.0	260.0	310.0	390.0	450.0	505.0	535.0
Consanguineous	10.2	200.0	252.0	332.5	400.0	450.1	518.0	599.0
<b>d. Placental surface area</b>								
Non- consanguineous	89.8	153.2	165.0	198.0	226.3	253.8	288.9	314.0
Consanguineous	10.2	154.4	177.8	203.9	226.3	261.6	312.7	344.1

Table 1.a reveals that in non-consanguineous group 5<sup>th</sup> and 10<sup>th</sup> percentiles of birth weight were higher as compared to consanguineous group, after which there was no consistent relationship. Table 1.b reveals that in consanguineous group, percentiles of placental weight were higher as compared to non-consanguineous group except 5<sup>th</sup> and 90<sup>th</sup> percentiles.

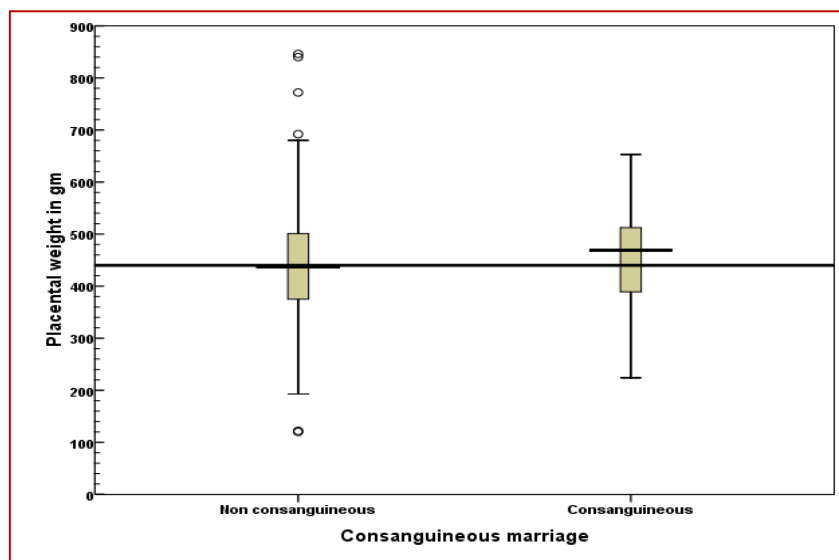
Table 1.c reveals that in consanguineous group 25<sup>th</sup> to 95<sup>th</sup> percentiles of the placental volume were higher as compared to non-consanguineous group whereas, opposite trends were observed in 5<sup>th</sup> and 10<sup>th</sup> percentiles.

Table 1.d reveals that in consanguineous group the percentiles of placental surface area were higher as compared to non-consanguineous group except in case of 50<sup>th</sup> percentile, where both were same (226 cm sq).



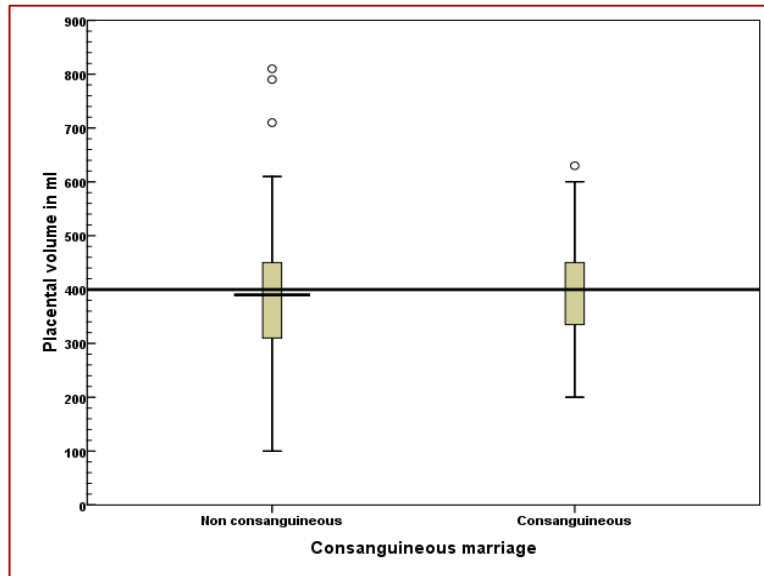
**Fig 1: Box plots of birth weight by consanguineous marriage**

Box plots of birth weight by consanguineous marriage in Fig 1 reveal that the overall median reference line of birth weight was at 2700 gm. Birth weight was lower in consanguineous group (2650 gm) as compared to non-consanguineous group (2700 gm). Birth weight exhibited wide spread outliers in non-consanguineous group.



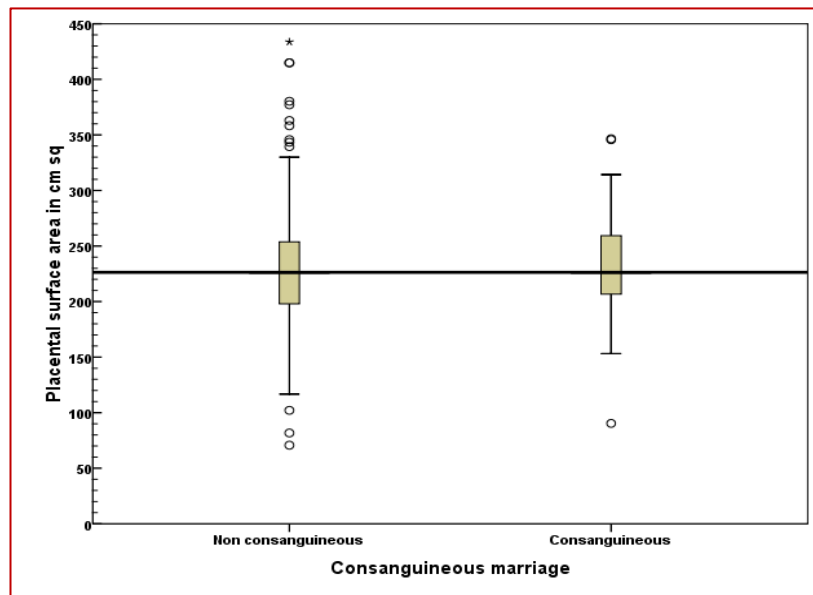
**Fig 2: Box plots of placental weight by consanguineous marriage**

Box plots of placental weight by consanguineous marriage in Fig 2. reveal that the overall median reference line of placental weight was at 440 gm. Placental weight was higher in consanguineous group (469 gm) as compared to non-consanguineous group (436 gm).



**Fig.3: Box plots of placental volume by consanguineous marriage**

Box plots of placental volume by consanguineous marriage in Fig.3 reveal that the overall median reference line of placental volume was at 400 ml. Median of placental volume was higher in consanguineous group (400 ml) as compared to non-consanguineous group (390 ml).



**Fig.4: Box plots of placental surface area by consanguineous marriage**

Box plots of placental surface area by consanguineous marriage in Fig 4 reveal that the overall median reference line of placental surface area was at 226 cm sq. The 75<sup>th</sup> and 25<sup>th</sup> percentiles of placental surface area were higher in consanguineous group as compared to non-consanguineous group, whereas, as the medians did not exhibit any difference.

### Discussion

In the present study the consanguinity rate was 10.2 percent, whereas in another study from Tirupati reported 40 percent of consanguinity<sup>12</sup>, suggesting higher prevalence of consanguineous marriages. The low rate of consanguinity in present study may be due to the awareness in society regarding the genetic disorders of neonate by consanguineous marriages.

In the present study consanguineous marriages exhibited lower birth weight in lower percentile (5<sup>th</sup> to 50<sup>th</sup> percentile) as compared to newborn from non-consanguineous marriages, many studies have reported the decrease in birth weight in consanguineous marriages as compared to non consanguineous marriages<sup>9,13</sup>.

In the current study percentiles of placental weight in consanguineous group were higher as compared to non-consanguineous group except (extremes) 5<sup>th</sup> and 90<sup>th</sup> percentiles. In consanguineous group the percentiles of placental surface area were nearly higher as compared to non-consanguineous group. To compare these results of placental morphometry and consanguineous marriages with other studies there is scarcity of literature.

## CONCLUSION

In non-consanguineous group 5<sup>th</sup> and 10<sup>th</sup> percentiles of birth weight were higher as compared to consanguineous group, after which there was no consistent relationship.

In consanguineous group, percentiles of placental weight were higher as compared to non-consanguineous group except 5<sup>th</sup> and 90<sup>th</sup> percentiles.

In consanguineous group 25<sup>th</sup> to 95<sup>th</sup> percentiles of the placental volume were higher as compared to non-consanguineous group whereas, opposite trends were observed in 5<sup>th</sup> and 10<sup>th</sup> percentiles.

In consanguineous group the percentiles of placental surface area were higher as compared to non-consanguineous group except in case of 50<sup>th</sup> percentile, where both were same (226 cm sq).

The essence of the study exhibits the near relationship and influence of consanguinity with placental morphometry, but there is no consistent relationship between the factors. Hence, to generalize the influence and to observe the consistent relationship of consanguinity with placental morphometry and birth weight, there is need to study the factors in large populations.

## Limitations

The current study results need revalidation in higher settings of society with a large number of population.

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