

## PLACENTAL CHARACTERISTICS AND NEONATAL OUTCOME OF SINGLETON DELIVERIES IN A ZONAL HOSPITAL, JANAKPUR

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### ABSTRACT

**Background:** There are number of maternal and neonatal factors that determine placental characteristics which in turn determine intrauterine life of the fetus. There are limited studies regarding the topic in Nepalese context. Therefore this study aimed to assess the placental characteristics and neonatal outcome of singleton deliveries in a Zonal hospital.

**Methods:** Cross-sectional study was carried out among 300 women with single term delivery using convenience sampling. A structured interview schedule, placental examination performa and APGAR score were used to collect data. Data were entered in SPSS version 20 for Windows and analyzed using descriptive and inferential statistics.

**Results:** Findings revealed that almost all placentas were red in color (93.3%), round in shape (99.3%), centrally located umbilical cord (96.0%) and normally inserted placental membrane. Mean placental weight and umbilical length was 492.17 ( $\pm 99.160$ ) gm and 52.89 ( $\pm 11.151$ ) cm respectively. Almost all neonates had normal birth weight i.e. 2500 gm., mean weight 2936.13 gm. ( $\pm 368.33$ ). Seventeen percent of neonate had mild to severe asphyxia in one minute. Significant association was found between placental weight and maternal factors such as educational status ( $p = 0.008$ ), annual household income ( $p = 0.013$ ) and parity ( $p = 0.001$ ). Significant relationship was found between weight of placenta and weight of neonate ( $r_s = 0.335$ ,  $p = <0.05$ ) as well as weight of neonate and APGAR score ( $r_s = 0.145$ ,  $p = <0.05$ )

**Conclusions:** Few deliveries have marginal cord insertion and circumvallate placenta. Some neonates have asphyxia and admitted to intensive care unit. Hence regular placental examinations provide valuable information immediate care to mother and neonates.



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### INTRODUCTION

Placenta is a vital organ that plays a significant role in growth and development of fetus in intrauterine life.<sup>1</sup> It also contributes for the survival in extra uterine life and also during childhood and adulthood.<sup>2</sup> Placenta is almost circular in shape with the average weight of approximately 1:6<sup>th</sup> (500gm) of the fetal.<sup>3</sup> Placental characteristics are influenced by various maternal and fetal factors. Mother's age, parity, gestational weight gain, fasting blood glucose and obesity are the important determinants affecting growth of placenta.<sup>4-6</sup> Likewise, Pregnancy Induced Hypertension (PIH) and gestational diabetes mellitus also affects the characteristics of placenta.<sup>2,7</sup> It decreases placental perfusion due to vasospasm of maternal blood vessels, eventually leading to irregular which increases the incidence of placental infarcts, retro-placental hematoma and calcification.<sup>8,9</sup>

Placental characteristics such as cord length,<sup>10,11</sup> placental weight, cotyledon's number and insertion site have a significant affect on the fetal outcome<sup>12</sup> Both short (< 30 cm) and long cords (>100cm) are associated with increased risk

of cord complication, operative interference, intrapartum complications, birth asphyxia, fetal growth restriction and congenital malformation.<sup>10</sup> Marginal cord insertion is associated with intra uterine growth restriction, stillbirth and neonatal death.<sup>13,14</sup> Similarly circumvallate placenta results in poor pregnancy outcomes such as; preterm delivery, placental abruption, emergency cesarean section, small for gestational age, neonatal death, neonatal intensive care unit admission.<sup>15</sup> Proper examination of placenta provides the information about the health status of mother and baby and it's timely management.<sup>16</sup> Therefore the aim of the study was to find out the placental characteristics and neonatal outcome of singleton deliveries in a Zonal Hospital.

### METHODS

A cross-sectional survey was carried find out at Janakpur Zonal Hospital, Nepal among women who delivered a single baby vaginally at term i.e. 37-42 weeks of gestation and who had their newborn and freshly delivered placenta at site in maternity ward of Janakpur Zonal hospital. Those women with multiple pregnancies, preterm delivery, cesarean section, unknown gestational age

and macerated stillbirth, home deliveries and women not willing to participate in the study were excluded from the study. Ethical clearance was taken from Chitwan Medical College Institution Research Committee (Ref no. CMC-IRC/PG/075/076-127), Bharatpur. Permission for data collection was also taken from Janakpur Zonal Hospital authority and informed consent was taken from the participants. After obtaining permission, researcher herself collected the data from 7 am in the morning till 7pm in the evening using a structured interview schedule, APGAR score, anthropometric measurement and observation checklist.

All the required equipment for the procedure such as disposable gloves, medium sized plastic bowl, digital weighing machine to weight placenta, infant weighing scale for neonate, plastic measuring tape, virex solution for the disinfection, were collected prior to procedure. Universal precautions such as gloves, mask, and eyeglass was adopted while examining and handling the baby and placenta.

First of all, women who met the inclusion criteria were identified and waited for the delivery. After delivery APGAR score of newly born baby was recorded within 1 minute. Then weight of neonate was taken using infant weighing scale and neonatal examination was done by inspection. Head and chest circumference was measured using plastic measuring tape. Again APGAR score was assessed and recorded within 5 minutes of delivery. Delivered placenta was received in plastic bowl. Extra clot if present was removed for clear vision. Placenta was examined quickly by placing it on the examination table. Placenta was kept in the plastic bowl and weighted using digital weighing scale by adjusting weight of plastic bowl to 0 in the weighing scale. The length of cord in placenta as well as length of cord left in neonate was measured using plastic measuring tape. All the findings were recorded in the form. Finally delivered women were interviewed for the demographic and obstetric information. Each day 10-12 respondents were interviewed and their placenta and baby were examined. Nearly 30- 45 minutes were given for each respondent.

Obtained data were checked for completeness and accuracy. Then the data was entered into Epi data 3.1 and exported into SPSS version 20 for windows for analysis. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to describe neonatal and maternal characteristics. Chi-Square test ( $\chi^2$ ) was used to find out the association between the dependent and independent variables. Moreover Pearson correlation was used to find out the relationship among variables. Findings of the study were presented in tables.

## RESULTS

Table 1 illustrates that more than two third (71.7%) of the respondents were between the age group of 20 – 29 years where minimum age was 16 years and maximum number 35 years. Most of them were urban dwellers (82.35%), belonged to Brahmin/Chhetri ethnicity (57.3%) and followed Hinduism (94.3%). Just more than half (57.3) were literate and only five percent were involved in income generating services. The mean age of marriage was 17.41 ( $\pm 1.468$ ) years, with minimum age 14 years and maximum

age 22 years. More than two third (75.0%) were multiparous, 15% had completed four ANC visit and 4.0% had history of pregnancy induced hypertension. Regarding neonatal characteristics; higher percentage (29.7%) of the neonates were delivered at 37 weeks and least (10.0%) were delivered at 41 weeks of gestation. More than half (56.3%) neonates were male and 43.7% were female (Table 1).

**Table 1: Maternal and neonatal characteristics of singleton deliveries n= 300**

Variables	Number (%)
<b>Age group (in years)</b>	
≤19	69 (23.0)
20-29	215(71.7)
≥30	16 (5.3)
<b>Median Age (IQR) =21 (21-24) Year, Min. 16 Year, Max. 35 Years</b>	
<b>Residence</b>	
Rural Municipality	53 (17.7)
Urban Municipality	247 (82.3)
<b>Religion</b>	
Hinduism	283 (94.3)
Buddhism	3 (1.0)
Islam	14 (4.7)
<b>Ethnicity</b>	
Dalit	42 (14.0)
Janajati	54 (18.0)
Muslim	14 (4.7)
Brahmin/Chhetri	190 (63.3)
<b>Education Status</b>	
Illiterate	128 (42.7)
General Literate	40 (13.3)
Basic up to class 8	69 (23.0)
Secondary Education (class 9-12)	53 (17.7)
Bachelor	10 (3.3)
<b>Employment Status</b>	
Unemployed*	285 (95.0)
Employed	15 (5.0)
<b>Annual Household Income (Rs)</b>	
<100,000	88 (29.3)
≥100,000	212 (70.7)
<b>Mean Age (SD) of Marriage: 17.41(<math>\pm 1.468</math>), Min. 14 Years, Max. 22 Years</b>	
<b>Parity</b>	
Primiparous	75 (25.0)
Multiparous	225 (75.0)
<b>In Current Pregnancy H/O PIH*</b>	
Yes	12 (4.0)
No	288 (96.0)
<b>Number of ANC Visit</b>	
<4	255 (85.0)
≥4	45 (15.0)
<b>Mean ANC Visit:3.53 (<math>\pm 1.540</math>), Min. 0 visit, Max. 8 visit</b>	
<b>Mean(<math>\pm</math> SD)Week of Gestation: 38.87<math>\pm</math> 1.188, Min. 37 Week, Max. 41 Week</b>	
<b>Sex of Baby</b>	
Male	169 (56.3)
Female	131 (43.7)

\*PIH: Pregnancy Induced Hypertension

**Table 2: Placental characteristics of singleton deliveries**  
n= 300

Variable	Number (%)
<b>Color</b>	
Red	280 (93.3)
Greenish	19 (6.3)
Yellow	1(0.3)
<b>Shape</b>	
Round	298 (99.3)
Irregular	2 (0.7)
<b>Placental Weight (gm)</b>	
Normal weight ( $\geq 500$ )	146 (48.7)
Low weight ( $< 500$ )	154 (51.3)
<i>Mean <math>\pm</math> SD; 492.17gm (<math>\pm</math> 99.160), Min. 269 gm, Max. 829 gm</i>	
<b>Umbilical Cord Length (cm)</b>	
Normal cord (35 – 70)	275 (91.7)
Short cord ( $<35$ )	4 (1.3)
Long cord ( $>70$ )	21 (7.0)
<i>Mean<math>\pm</math> SD; 52.89 cm (<math>\pm</math> 11.151), Min. 32 cm, Max. 96 cm</i>	
<b>Site of Umbilical Cord Insertion</b>	
Central	288 (96.0)
Marginal	12 (4.0)
<b>Insertion of Placental Membrane</b>	
Normal	290 (96.7)
Circumvallate	10 (3.3)
<b>True Knot</b>	
Present	7 (2.3)
Absent	293 (97.7)

Table 2 reveals that almost all placentas were red in color (93.3%) and round in shape (99.3%). Less than half (48.7%) had normal weight ( $\geq 500$ ) with the average weight 492.17 ( $\pm$  99.160) gm. Almost all cord were centrally located (96%), had normally inserted placental membrane (96.7%) and had normal cord length (91.7%) i.e. 35-70 cm. The average cord length was 52.89 ( $\pm$  11.151) cm and all cord had two arteries and one umbilical vein.

**Table 4: Association between placental weight and maternal and neonatal characteristics of singleton deliveries**

n= 300

Variables	Placental Weight		$\chi^2$	p-value	OR
	Low $< 500$ gm No. (%)	Normal ( $\geq 500$ gm) No.(%)			
<b>Age in Year</b>					
$\leq 19$	42 (60.9)	27 (39.1)	3.278	0.194	
20-29	104 (48.4)	111 (51.6)			
$\geq 30$	8 (50.0)	8 (50.0)			
<b>Residence</b>					
Rural municipality	30 (56.6)	23(43.4)	0.716	0.398	
Urban municipality	124(50.2)	123(49.8)			
<b>Educational status</b>					
Literate	77 (44.8)	95 (55.2)	6.96	0.008*	0.537
Illiterate	77 (60.2)	51 (39.8)			

Table 3 reveals that almost all neonates (93.3%) had normal birth weight ( $\geq 2500$  gm) with the mean weight of 2936.13 gm. All the neonates were alive and did not have any kinds of congenital abnormalities at the time of birth. Only 17.7% of neonate had asphyxia (4.0% severe, 13.7% mild asphyxia) in 1 minute while 10.7 % of neonate had asphyxia in 5 minutes (severs 2.7%, mild 10.7%) of birth. Only 10.7 % of neonates were admitted to NICU after birth.

**Table 3: Neonatal outcome of singleton deliveries**

n = 300

Variable	Number (%)
<b>Weight of Neonate (gm)</b>	
Low birth weight ( $<2500$ )	20 (6.7)
Normal birth weight ( $\geq 2500$ )	280 (93.3)
<i>Mean <math>\pm</math> SD; 2936.13(<math>\pm</math> 368.33) gm, Min. 2000 gm, Max. 4000 gm</i>	
<b>Asphyxia in 1 minute</b>	
No Asphyxia	247 (82.3)
Mild Asphyxia	41 (13.7)
Severe Asphyxia	12 (4.0)
<i>Mean APGAR <math>\pm</math> SD; 7(<math>\pm</math> 1.24), Min. 2 Score, Max. 6 Score</i>	
<b>Asphyxia in 5 minute</b>	
No Asphyxia	268 (89.3)
Mild Asphyxia	24 (8.0)
Severe Asphyxia	8 (2.7)
<i>Mean APGAR <math>\pm</math> SD; 7.87(<math>\pm</math> 1.24), Min. 2 score, Max. 9 score</i>	
<b>Admission to NICU</b>	
No	268 (89.3)
Yes	32 (10.7)

Table 4 reveals that the weight of placenta was significantly associated with maternal educational status ( $p= 0.008$ ), annual household income ( $p=0.013$ ) and parity ( $p<0.001$ ). However maternal age, residence, employment status, number of ANC visits, history of PIH and sex of the baby were not associated with placental weight.

Employment status					
Employed	8 (53.3)	7(46.7)	0.025	0.874	
Unemployed	146 (51.2)	142 (48.8)			
Annual household income (Rs)					
<100,000	55 (62.5)	33 (37.5)	6.216	0.013*	1.902
≥ 100,000	99 (46.7)	113 (53.3)			
Parity					
Primiparous	54 (72.0)	21 (28.0)	17.097	<0.001*	3.21
Multiparous	100 (44.4)	125 (55.6)			
H/O PIH in current pregnancy*					
Yes	8 (66.7)	4 (33.3)	1.176	0.278	
No	146 (50.7)	142 (49.3)			
Number of ANC Visit					
< 4	136 (53.3)	119 (46.7)	2.722	0.099	
≥ 4	18 (40.0)	27 (60.0)			
Sex of baby					
Male	86 (50.9)	83 (49.1)	0.31	0.861	
Female	68 (51.3 5)	63 (48.1)			

\*Significance level at 0.05 \*H/O PIH: History of Pregnancy Induced Hypertension

Table 5 shows that there was significant strong positive correlation between Apgar score in 1 minute and 5 minute ( $r = 0.926$ ), placental weight was positively correlated with weight of neonate ( $r = 0.335$ ). Likewise neonatal weight and Apgar

score in 5 minute was also correlated ( $r = 0.145$ ). Umbilical cord length was also correlated with the weight of neonate ( $r = 0.143$ ) and weight of placenta ( $r = 0.013$ ).

**Table 5: Relationship among placental characteristics and neonatal outcome of singleton deliveries**

n=300

Variables	Apgar in 1min	Apgar in 5 min	Weight of neonate	Weight of placenta	Umbilical cord length
Apgar in 1 min	1				
Apgar in 5 min	0.926*	1			
Weight of neonate	0.111	0.145*	1		
Weight of placenta	0.039	0.079	0.335*	1	
Length of umbilical cord	-0.025	0.019	0.143*	0.138*	1

\*spearman correlation coefficient significant at the 0.05 level (2-tailed)

## DISCUSSION

This study evaluated the placental characteristics and neonatal outcome of 300 singleton deliveries at Janakpur Zonal Hospital. Out of 300 deliveries two third (71.7%) of the women are between 20-29 years of age. More than half (57.3%) of the women are literate and only five percent are involved in income generating services. The average age of marriage of the women is 17.41( $\pm 1.468$ ) years. Two third of the women (75%) were multiparous and only 15% of the women have completed their four antenatal visits.

Mean placental weight was 492.17 ( $\pm 99.16$ ) gm it is slightly higher than mean placental weight of 458.25 g as reported in India.<sup>17</sup> However it is lower than the mean placental weight of 636 g and 673.1g reported in Sudan and Norway respectively.<sup>4,16</sup> The variation in the mean weight of the placenta may be due to variations in the methodology of preparing and weighing the placenta.

Regarding neonatal outcome the mean birth weight of neonate was 2936 ( $\pm 368.33$ ) gm. However, it is lower

in comparison to the mean birth weight (355.91 gm) of neonate reported in Norway.<sup>4</sup> This difference in mean birth weight may be due to maternal nutrition, environmental factor and lifestyle pattern of the respondents.<sup>18</sup>

The mean Apgar score was 6.79, which is normal. Most of the neonates (82.3%) were in good condition in 1 minute i.e. no asphyxia, however 17.7% had asphyxia (13.7% mild asphyxia and 4% severe asphyxia). Likewise 10.7% of the neonates who had asphyxia in 5 min were referred to Neonatal Intensive Care Unit (NICU). This finding is almost similar to Sudan where 12.72% of the neonates were admitted to Neonatal Intensive Care Unit.<sup>19</sup>

While assessing the association between placental weight and other variables this study found that placental weight was associated with parity; multiparous women had 3.21 times increased chances of having normal placental weight (>500g) compared to primiparous women. This is similar to the study of Norway<sup>5</sup> in which they found that multipara women had 37.9 g higher placental weight than primiparous women. This is also supported by the findings of study

conducted by in which result showed that placental weight increased significantly with parity up to 10 babies.<sup>19</sup>

While assessing the relationship among different variable this study found significant relationship between the placental weight and weight of neonate. This is similar to study conducted in Germany and Iran, which concluded that placental weight was correlated to birth weight.<sup>20,21</sup> This indicates that placenta contains the influencing factor that has effect on the outcome of the neonate.<sup>19</sup>

Similarly umbilical cord length had significant weak positive relationship between neonatal weight and placental weight, which is similar to findings of Nigeria in which positive relation was seen between umbilical cord length, and weight of baby at birth.<sup>22</sup>

## CONCLUSION

Based on the findings, it is concluded that almost all placenta

appear normal however the mean weight of placenta is lower than the normal weight. Weight of placenta is affected by various maternal characteristics such as parity, education and economic status. Few deliveries have marginal cord insertion and circumvallate placenta. Some neonates have asphyxia and admitted to intensive care unit. Therefore, protocol for examination of placenta is necessary for the earlier management of neonatal condition, which will ultimately help in prevention of maternal and neonatal morbidity and mortality.

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