RELATIONSHIP BETWEEN PLACENTAL LOCATION, BLOOD GROUP, GENOTYPE AND PARITY IN PORT HARCOURT WOMEN

ABSTRACT

Aim: Placental location affects the outcome of pregnancy. The influence of certain maternal factors on placental location is unknown. This study aimed at investigating the relationship between placenta location, maternal blood group, maternal genotype and parity among Port Harcourt women.

Methodology: 250 ante natal/post-natal medical records of parous women were randomly selected at the University of Port Harcourt Teaching Hospital. Data obtained were analyzed using IBM SPSS version 23.0 and Microsoft Office Excel. Continuous variables were presented as mean±SD, while categorical variables were presented using frequency distribution tables and percentages. Inferential statistics was carried out using Chi-square in other to establish relationship between variables. Significant level was placed at 95% confidence interval, hence $P < 0.05$ was considered significant.

Results: Anterior placental location was predominant (47%, n=118) followed by posterior placenta (45%, n=113) while Fundal was the least (8%, 19). Majority of the women were of the O blood group (67.6%, n=169), blood group A (18%, n=45) was next, blood group B (13%, n=33) while AB (1.2%, n=3) was the least. Genotype AA was predominant (83.6%, n= 209), followed by AS (15.6%, n= 39) whereas genotype SS (0.8%, n= 2) was the least. The distribution of parity showed that women who had given birth twice designated as Two were predominant (33.2%, n= 83), followed by those who had given birth once designated as One, (30.8%, n=77), Three (19.2%, n= 48) while Four and above, (10.8%, n= 27) were the least. The association between placenta location and blood group was not significant ($p>0.05$). Similarly, there was no significant association between placenta location and genotype ($\rho>0.05$). However, there was a significant association ($p<0.05$) between placenta location and parity.

Conclusion: Placental location had no association with blood group and genotype but was associated with parity. Predictability of placenta location using maternal age, gestational age, blood group, genotype and parity was not significant ($p>0.05$).

Key words: relationship; placenta location; maternal; blood group; genotype; parity

1. Introduction

For foetal growth and development a normal placental function is necessary. The placenta is a planate circular organ in the uterus of pregnant mammals that nourishes and maintains the fetus through the umbilical cord. The umbilical cord is the main link from the fetus to the placenta[1]. The placenta connects the developing fetus to the uterine wall to allow nutrient uptake, provide thermo-regulation to the fetus, waste elimination, and gas exchange via the mother's blood supply, fight against internal infection and produce hormones to support

pregnancy[2]. Through the umbilical cord, the placenta provides oxygen and nutrients to the growing baby and removes waste products[1]. In most pregnancies, implantation occurs in the upper portion of the fundus. It has been found that 37% of placentas attach anteriorly, 24% posteriorly, and 34% in fundal position[3]. Placental position and morphology may change considerably during pregnancy. If the area of implantation is less than optimal for placental development, the placenta moves to a more suitable region of the endometrium for adequate blood supply. Parts of the placenta located in less favourable positions atrophy with time. For example, low implantation of the placenta occurs frequently in early pregnancy, but this may change through differential growth of the placenta and uterus.

Relationship between placental location, pregnancy outcomes and blood groups has been investigated. Anterior placental implantation was associated with an increased risk of pregnancy-induced hypertension, gestational diabetes mellitus, placental abruption, intrauterine growth retardation and intrauterine foetal death while posterior placenta had a significant association with preterm labour and A-positive blood group. An anterior placenta was significantly associated with intrauterine growth retardation and intrauterine foetal death. Similarly, majority (54%) of women with an anterior placenta were O-positive blood group, while 46% of women in the posterior placenta group were A-positive blood group[4]. An investigation into the influence of placental location (PL) on fetal presentation-(FP) at birth and association between certain pregnancy-complications and placental location has been undertaken. Patients with posterior placental location (significantly associated with previous-Caesarian Section (CS) had a significantly higher CS rate (due to previous-CS and breech-presentation). Significant differences were found in terms of gestational-hypertension and fresh-placental-weight between different sites of PL[5]. Placental location may have a relationship with blood group and genotype. Similarly an association may also exist between parity, gestational age and placental location. These relationships have not yet been investigated. This study therefore examines them as well as predictability of placenta location using those parameters.

2. Materials and Methods

The study was a retrospective study which investigated the Relationship Between Placental Location, Blood Group and Genotype in Port Harcourt Women.

A survey of pregnant women from October 1, 2013 to September 30, 2017 as well as delivery of the pregnancy was undertaken using medical records. 250 ante natal/post-natal medical records of the women obtained randomly at the Obstetrics and Gynaecology Unit of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State, Nigeria were used. Placental locations were recorded. Each placenta was categorized as anterior, posterior and fundal. Lateral placentas located on the left or right portion of the anterior and posterior uterine walls were classified as anterior and posterior respectively. Data were also collected for other variables such as maternal blood group, genotype and parity.

With the IBM Statistical Package of Social Sciences (IBM SPSS version 23.0) and Microsoft Office Excel, data obtained were analyzed. Continuous variables were presented as mean±SD, while categorical variables were presented using frequency distribution tables and percentages. Inferential statistics was carried out using Chi-square in other to establish relationship between variables. Significant level was placed at 95% confidence interval,

hence P < 0.05 was considered significant. Results obtained were presented in tables, charts and graphs. Approval to carry out the study was received from the Research Ethics Committee of the Department of Anatomy.

3. Results and Discussion

Figure 1 shows distribution of placental location. Anterior and posterior placentas were the commonest (47%, n=118; 45%, n=113) respectively while fundal placenta (8%, n=19) (Figure 1). Figure 2 shows distribution of blood group. Blood group O was the commonest (67.6%, n=169), blood group A (18%, n=45), blood group B (13%, n=33) while AB was (1.2%, n=3). Figure 3 describes the distribution of genotype. AA was (83.6%, n=209), AS (15.6%, n=39) and SS, (0.8%, n=2). Figure 4 shows the distribution of parity (birth order) among the women. Those who had not yet given birth designated as None was (6%, n=15), those who gave birth once designated as One (30.8%, n=77), twice designated as Two (33.2%, n=83), Three (19.2%, n=48) while Four and above (10.8%, n=27). Table 1 shows the association between placenta location and blood group. There was no significant association between placental location and blood groups (p>0.05). Table 2 describes the association between placenta location and genotype. There was no significant association between placental location and genotype (p>0.05). Table 3 shows the association between placenta location and parity. A significant association exits between placental location and parity (p<0.05). Table 4 describes classification and predictability of placenta location.

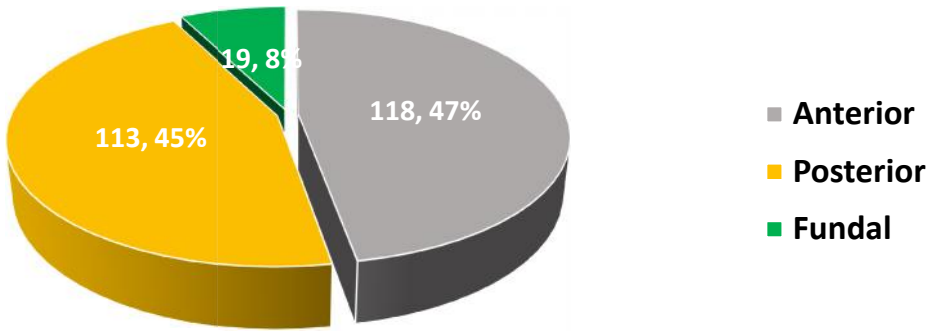

Figure 1: Pie chart showing the distribution of Placenta Location

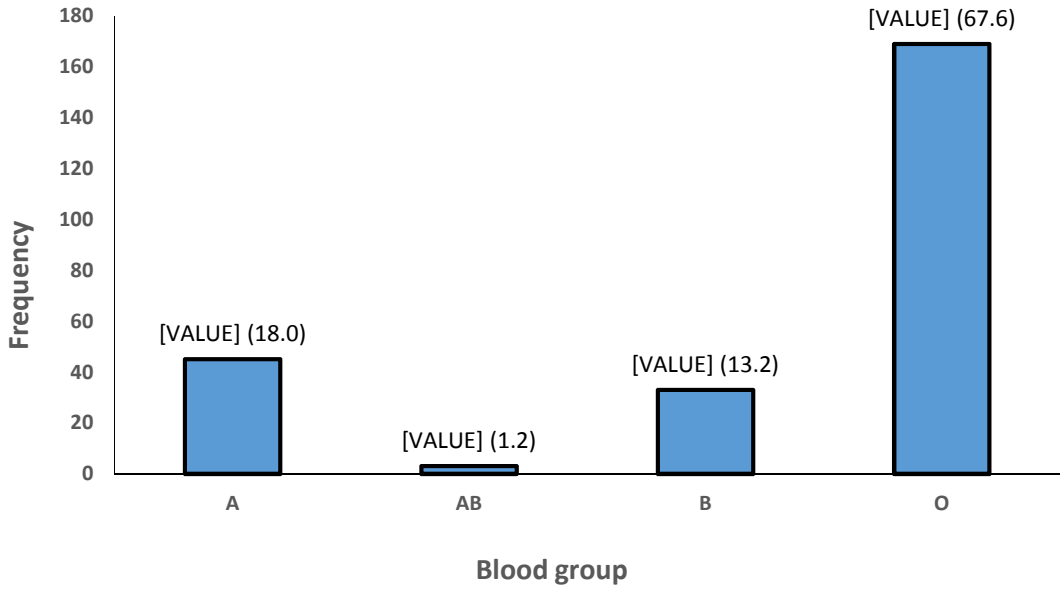

Figure 2: Bar chart showing the distribution of Blood Group

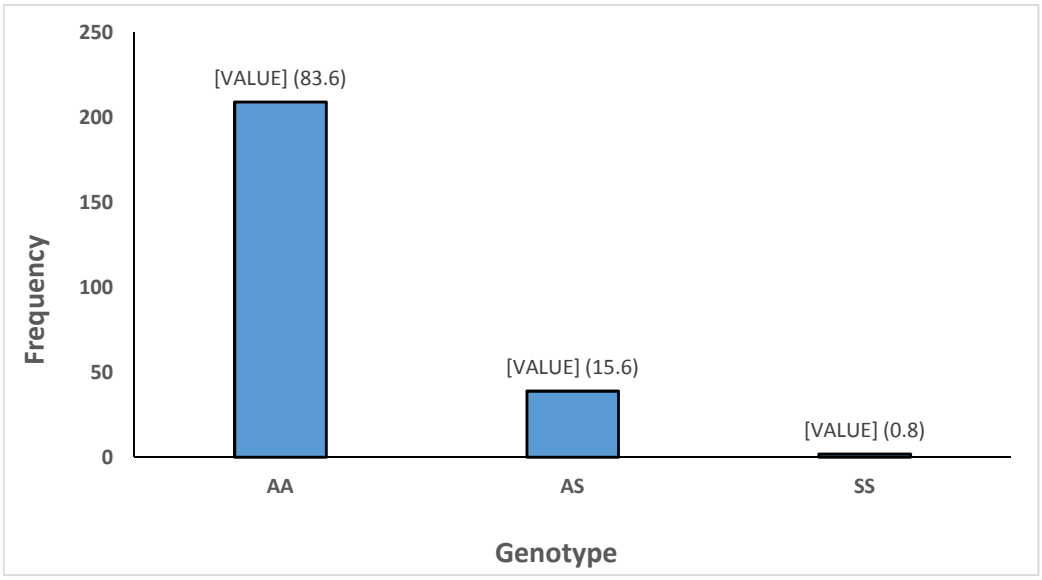

Figure 3: Bar chart showing the distribution of Genotype

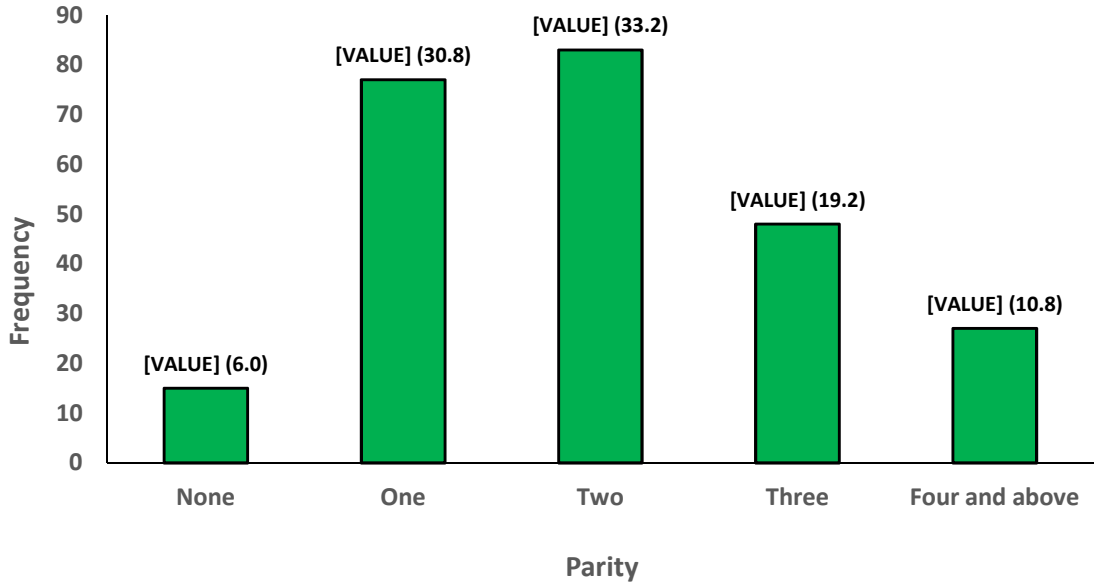

Figure 4: Bar chart showing the distribution of Parity

Table 1: Association between Placenta location and Blood group

Placenta Location	Blood Group				Chi-square		
	A [%]	AB [%]	B [%]	O [%]	X^2	Df	*P*-value
Anterior	24 (20.3)	2 (1.7)	13 (11.0)	79 (66.9)			
Posterior	18 (15.9)	1 (0.9)	19 (16.8)	75 (66.4)	4.09	6	0.66
Fundal	3 (15.8)	0 (0.0)	1 (5.3)	15 (78.9)			

X2 *= Chi-square,* ***df*** *= degree of freedom,* ***P-value*** *= Probability value*

Table 2: Association between Placenta location and Genotype

Placenta Location	Genotype			Chi-square		
	AA [%]	AS [%]	SS [%]	X^2	Df	*P*-value
Anterior	96 (81.4)	21 (17.8)	1 (0.8)			
Posterior	96 (85.0)	16 (14.2)	1(0.9)	1.17	4	0.88
Fundal	17 (89.5)	2 (10.5)	0 (0.0)			

X2 *= Chi-square,* ***df*** *= degree of freedom,* ***P-value*** *= Probability value*

Table 3: Association between Placenta location and Parity

Placenta Location	Parity					Chi-square		
	None [%]	One [%]	Two [%]	Three [%]	Four and above [%]	X^2	df	*P*-value
Anterior	9 (7.6)	31 (26.3)	40 (33.9)	21 (17.8)	17 (14.4)			
Posterior	5 (4.4)	41 (36.3)	39 (34.5)	18 (15.9)	10 (8.8)	16.41	8	**0.04****
Fundal	1 (5.3)	5 (26.3)	4 (21.1)	9 (47.4)	0 (0.0)			

X2 *= Chi-square,* ***df*** *= degree of freedom,* ***P-value*** *= Probability value*

Table 4: Classification and predictability of placenta location

Placenta Location	B	S.E	Wald	df	*P*-value	Odd Ratio	95% C.I. for EXP(B)	
							Lower	Upper
Maternal age	-0.04	0.03	1.39	1	0.24	0.96	0.90	1.03
Gestational age	0.00	0.02	0.04	1	0.85	1.00	0.96	1.03
Blood Group			2.81	3	0.42			
Blood Group (1)	-0.27	0.36	0.58	1	0.44	0.76	0.38	1.54
Blood Group (2)	-0.83	1.25	0.44	1	0.51	0.44	0.04	5.09
Blood Group (3)	0.49	0.41	1.40	1	0.24	1.63	0.73	3.67
Genotype			0.89	2	0.64			
Genotype (1)	0.53	1.47	0.13	1	0.72	1.69	0.10	30.04
Genotype (2)	0.20	1.50	0.02	1	0.90	1.22	0.06	22.92
Parity	-0.14	0.11	1.55	1	0.21	0.87	0.70	1.08
Constant	1.05	1.83	0.33	1	0.57	2.86		

Key: B – beta coefficient, S.E – standard error, df – degree of freedom, C.I for EXP (B) – confidence interval for exponential of B

Among the women studied, anterior placental location was predominant followed by posterior placenta while fundal was the least. This is in agreement with the findings of Kalinithi et al.[6] who showed in their study that the most common placental locations in the second trimester were anterior and posterior. Certain factors could have been responsible for the predominance of anterior and posterior placental locations. These include fibroids which are acquired benign growths made of muscle tissue in the uterus[7]. Intramural fibroids constitute about 62% of the total number of fibroid cases. They are located within the anterior part of the uterine wall[8]. The blastocyst cannot implant where there is fibroid and this influences the location of the placenta.

Previous uterine scars or scarred tissues known as Asherman's syndrome could be responsible for posterior and fundal localisation of the placenta. Abdomino-pelvic surgery such as caeseran sections are carried out mainly on the anterior uterine wall which form scar tissues thereby making it impossible for the blastocyst to implant on the anterior uterine wall and causing it implant probably on the posterior uterine wall or fundal.

Similarly, multiple pregnancies also influence placenta location. In some cases, the zygotes implant separately and develop membranes that are independent of each other.

Congenital uterine conditions which are defect in the size, shape or structure of the uterus present at birth could also affect placenta location. When a baby girl is developing in the womb, the Mullerian ducts come together at about 10 weeks' gestation to form her uterus. For some baby girls, the Mullerian ducts do not come together completely. This results in congenital uterine conditions which include septate uterus, bicornate uterus, didelphic uterus and unicornate uterus. The shape of the uterus could cause restriction in implantation.

Location of pinopodes also influences placental location. Pinopodes are apical epithelial cellular protrusions on the endometrium of the uterus which are large enough to trap the cilia and prevent the blastocyst to be swept away by the cilia and this would facilitate close contact between the blastocyst and endometrial surface. Therefore, implantation is based on the location of pinopodes[9].

Placental location has been shown not to be associated with differences in newborn weight or other perinatal outcomes[10], whereas an association was observed between different placental locations and fetal weights in initial phase of third trimester however in rest of the third trimester an insignificant association was observed between the two variables[11]. None showed whether or not an association exists between placenta location and blood group. Majority of the women in our study belonged to blood group O, blood group A was next followed by B while AB was the least. Our finding that women with anterior placenta belong mainly to blood group O also agrees with that of Zia[4] who showed in his study that majority (54%) of women with anterior placenta were O whereas women in the posterior placental group were next (46%) and were blood group A. However, there was no relationship between placental location and blood group ($\rho>0.05$). This contrasted with Zia[4] who concluded that there was a relationship between placental location and blood group. The reason for this contrast is unclear but could be attributed to racial variation.

Genotype AA was predominant among the women studied followed by AS. SS was the least. There was no significant association between placenta location and genotype ($\rho>0.05$). This could be attributed to the fact that genotype is a single gene Mendelian inheritance and placental location is not hereditary.

The parity distribution showed that women who had given birth twice designated as Two were predominant, next were those who had given birth once designated as One, followed by Three, while Four and above were the least. A significant relationship was seen between placenta location and parity ($\rho<0.05$). Based on the number of times a woman has given birth and the mode of delivery, there are usually changes on the uterine wall which influences the site of placental implantation. A post hoc multiple test of placental location, maternal and gestational age showed no statistical significance ($p>0.05$) when all three variables were compared.

Predictability of placenta location using maternal age, gestational age, blood group, genotype was not significant ($p>0.05$). It could therefore be said that placenta location using those variables is unpredictable.

4. Conclusion

Placental location has no relationship with blood group, genotype and gestational age but does with parity. Predictability of placental location using maternal age, gestational age, blood group and genotype could not be achieved suggesting that it could be impossible. This could be peculiar to Port Harcourt women. We therefore recommend that further studies be carried out in other populations.

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