

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: The study was a retrospective study which investigated the Relationship Between Placental Location, Blood Group and Genotype in Port Harcourt Women in Port Harcourt, Nigeria. 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 antenatal/post-natal medical records of parous women were randomly selected at the University of Port Harcourt Teaching Hospital. 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.

Results: Anterior placenta was predominant (47%) followed by the posterior placenta (45%) while Fundal was the least (8%). Majority of the women were of the O blood group (67.6%), blood group A (18%) was next, blood group B (13%) while AB (1.2%) was the least. Genotype AA was predominant (83.6%), followed by AS (15.6%) whereas genotype SS (0.8%) was the least. The distribution of parity showed that women who had given birth twice designated as Two were predominant (33.2%), followed by those who had given birth once designated as One, (30.8%), Three (19.2%) while Four and above, (10.8%) 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 ($p>0.05$). 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. There was an absence of a relationship between placental location and these factors.

Keywords: relationship; placenta location; maternal; blood group; genotype; parity

1. Introduction

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 position³. 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

38 less favourable positions atrophy with time. For example, low implantation of the placenta
39 occurs frequently in early pregnancy, but this may change through the differential growth of
40 the placenta and uterus.

41 The relationship between placental location, pregnancy outcomes and blood groups has been
42 investigated. Anterior placental implantation was associated with an increased risk of
43 pregnancy-induced hypertension, gestational diabetes mellitus, placental abruption,
44 intrauterine growth retardation and intrauterine foetal death while posterior placenta had a
45 significant association with preterm labour and A-positive blood group⁴. An anterior placenta
46 was significantly associated with intrauterine growth retardation and intrauterine foetal
47 death⁴. Similarly, the majority (54%) of women with an anterior placenta were O-positive
48 blood group, while 46% of women in the posterior placenta group were A-positive blood
49 group⁴. An investigation into the influence of placental location on fetal presentation at birth
50 and association between certain pregnancy-complications and placental location has been
51 undertaken. Patients with posterior placental location significantly associated with previous-
52 Caesarian Section (CS) had a significantly higher CS rate due to previous-CS and breech-
53 presentation. Significant differences were found in terms of gestational-hypertension and
54 fresh-placental-weight between different sites of placental location⁵. Placental location may
55 have a relationship with blood group and genotype. Similarly an association may also exist
56 between parity, gestational age and placental location. These relationships have not yet been
57 investigated. This study therefore **examined** them as well as predictability of placenta
58 location using those parameters.

59

60 **2. Materials and Methods**

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

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

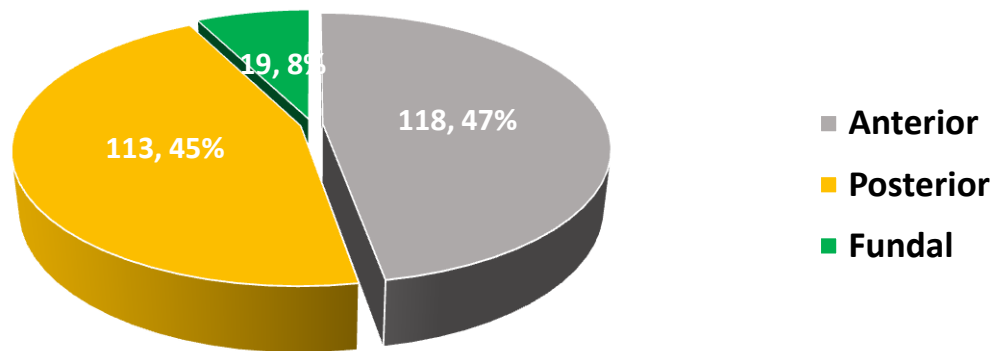
72 With the IBM Statistical Package of Social Sciences (IBM SPSS version 23.0) and Microsoft
73 Office Excel, data obtained were analyzed. Continuous variables were presented as
74 mean±SD, while categorical variables were presented using frequency distribution tables and
75 percentages. Inferential statistics were carried out using Chi-square in order to establish a
76 relationship between variables. Significant level was placed at 95% confidence interval,
77 hence $P < 0.05$ was considered significant. Results obtained were presented in tables, charts
78 and graphs. Approval to carry out the study was received from **the Research Ethics**
79 **Committee of the Department of Anatomy.**

80

3. Results and Discussion

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

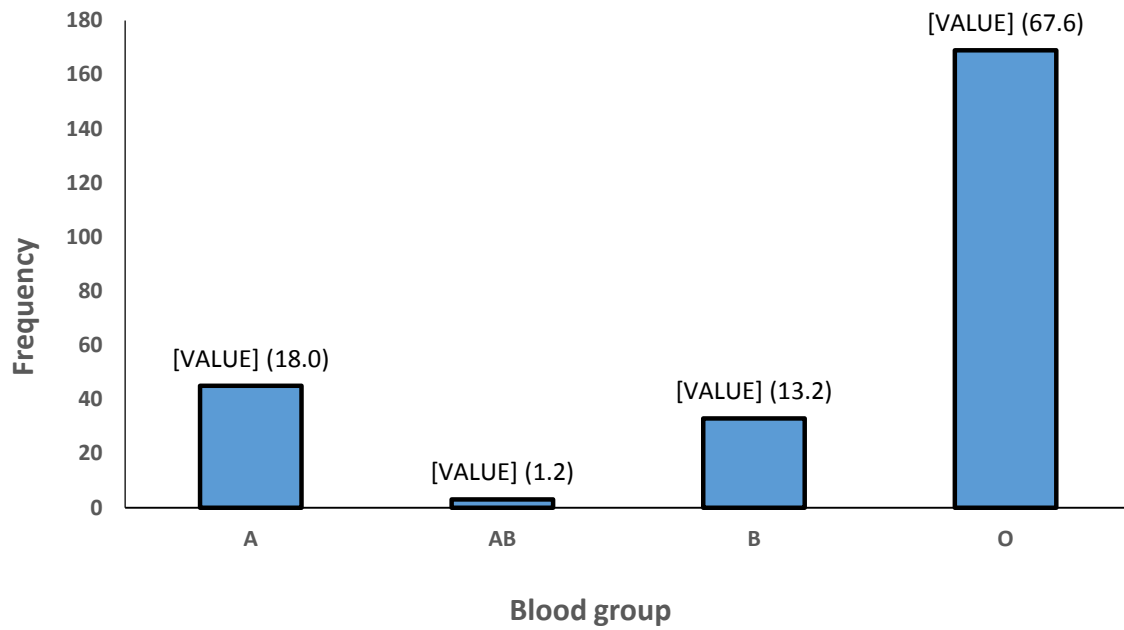
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Figure 1: Pie chart showing the distribution of Placenta Location

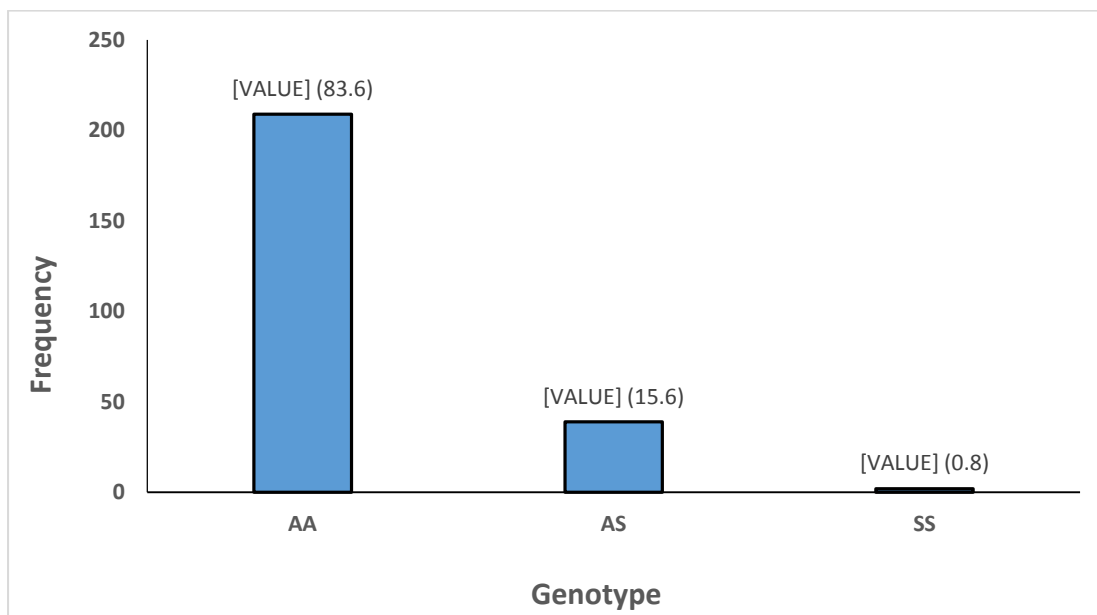


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Figure 2: Bar chart showing the distribution of Blood Group

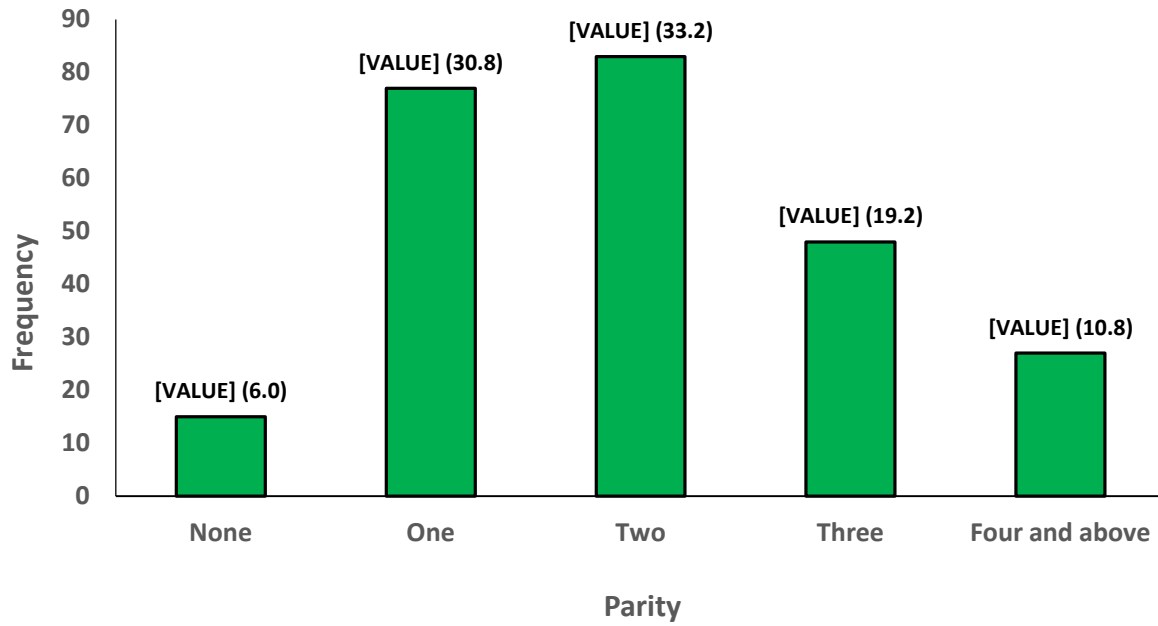
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Figure 3: Bar chart showing the distribution of Genotype



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Figure 4: Bar chart showing the distribution of Parity

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106 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)	4.09	6	0.66
Posterior	18 (15.9)	1 (0.9)	19 (16.8)	75 (66.4)			
Fundal	3 (15.8)	0 (0.0)	1 (5.3)	15 (78.9)			

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

108

109 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)	1.17	4	0.88
Posterior	96 (85.0)	16 (14.2)	1 (0.9)			
Fundal	17 (89.5)	2 (10.5)	0 (0.0)			

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

111

112 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)			

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

114

115 Among the women studied, anterior placental location was predominant followed by
 116 posterior placenta while fundal was the least. This is in agreement with the findings of
 117 Kalinithi et al.⁶ who showed in their study that the most common placental locations in the
 118 second trimester were anterior and posterior. Certain factors could have been responsible for
 119 the predominance of anterior and posterior placental locations. These include fibroids which
 120 are acquired benign growths made of muscle tissue in the uterus⁷. Intramural fibroids
 121 constitute about 62% of the total number of fibroid cases. They are located within the anterior
 122 part of the uterine wall⁸. The blastocyst cannot implant where there is fibroid and this
 123 influences the location of the placenta.

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

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

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

138 Location of pinopodes also influences placental location. Pinopodes are apical epithelial
 139 cellular protrusions on the endometrium of the uterus which are large enough to trap the cilia
 140 and prevent the blastocyst to be swept away by the cilia and this would facilitate close contact
 141 between the blastocyst and endometrial surface. Therefore, implantation is based on the
 142 location of pinopodes⁹.

143 The placental location has been shown not to be associated with differences in newborn
 144 weight or other perinatal outcomes¹⁰, whereas an association was observed between different
 145 placental locations and fetal weights in the initial phase of the third trimester however in rest

146 of the third trimester an insignificant association was observed between the two variables¹¹.
147 None showed whether or not an association exists between placenta location and blood
148 group. Majority of the women in our study belonged to blood group O, blood group A was
149 next followed by B while AB was the least. Our finding that women with anterior placenta
150 belong mainly to blood group O also agrees with that of Zia⁴ who showed in his study that
151 majority (54%) of women with anterior placenta were O whereas women in the posterior
152 placental group were next (46%) and were blood group A. However, there was no
153 relationship between placental location and blood group ($p>0.05$). This contrasted with Zia⁴
154 who concluded that there was a relationship between placental location and blood group. The
155 reason for this contrast is unclear but could be attributed to racial variation.

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

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

168 Predictability of placenta location using maternal age, gestational age, blood group, genotype
169 was not significant ($p>0.05$). It has shown that the location of the placenta cannot be
170 determined by those mentioned factors.
171

172 4. Conclusion

173 The placental location has no relationship with the blood group, genotype and gestational age
174 but does with parity. Anterior and posterior placenta locations were predominant among the
175 parous women in Port Harcourt whereas fundal was the least. Similarly, most of the women
176 belonged to blood group O followed by A while AB was the least. Genotype AA was the
177 most dominant followed by AS whereas SS genotype was the least. Predictability of placental
178 location using maternal age, gestational age, blood group and genotype is impossible. This,
179 however, could be peculiar to Port Harcourt women. We, therefore, recommend that further
180 studies be carried out in other populations. This finding can serve as a reference for future
181 research. Also, we suggest that it would be useful for further studies evaluating the
182 relationship between foetal and newborn weight be undertaken.

183

184 **Consent: NA**

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