



Relationship between Placental Location, Blood Group, Genotype and Parity in Port Harcourt Women

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Authors' contributions

This work was carried out in collaboration among all authors. Author KSO designed the study, performed the statistical analysis and wrote the protocol. Author MAA wrote the first draft of the manuscript and managed the analyses of the study. Author MCO managed the literature searches. All authors read and approved the final manuscript.

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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.

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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 position [1]. 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 the differential growth of the placenta and uterus.

The 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 [2]. An anterior placenta was significantly associated with intrauterine growth retardation and intrauterine foetal death [2]. Similarly, the 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 [2]. An investigation into the influence of placental location on fetal presentation 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 placental location [3]. 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 examined 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 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 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 were carried out using Chi-square in order to establish a 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

Fig. 1 shows the distribution of placental location. Anterior and posterior placentas were the commonest (47%, n=118; 45%, n=113) respectively while fundal placenta (8%, n=19) (Fig. 1). Fig. 2 shows the 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). Fig. 3 describes the distribution of genotype. AA was (83.6%, n=209), AS (15.6%, n=39) and SS, (0.8%, n=2). Fig. 4 shows the

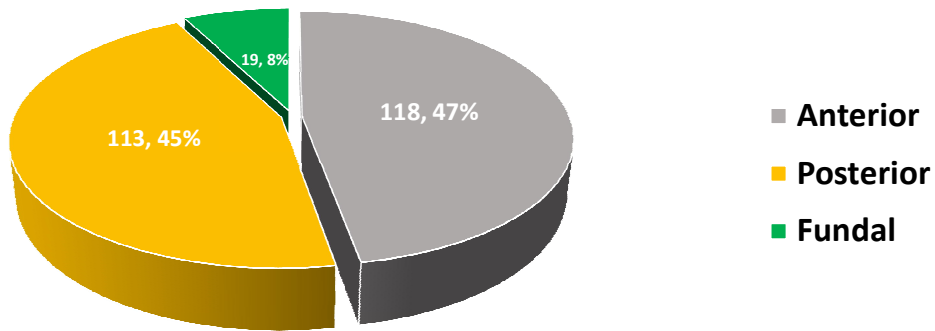


Fig. 1. Pie chart showing the distribution of placenta location

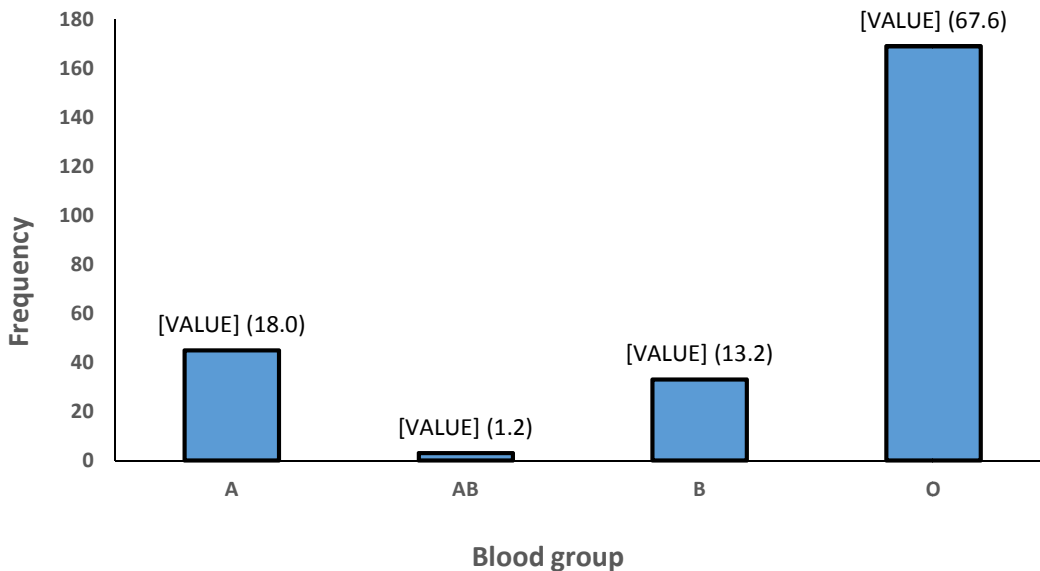


Fig. 2. Bar chart showing the distribution of blood group

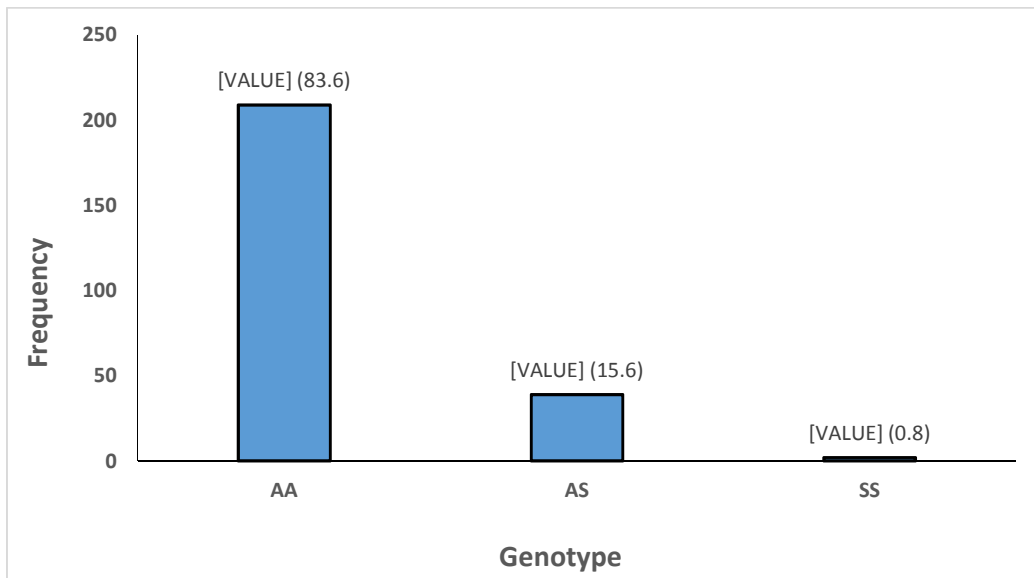


Fig. 3. Bar chart showing the distribution of Genotype

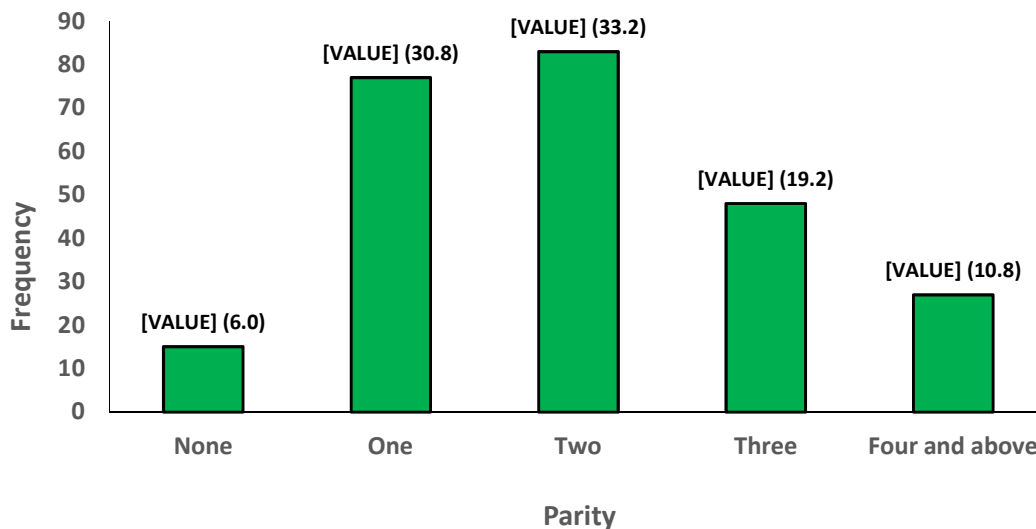


Fig. 4. Bar chart showing the distribution of parity

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 exists between placental location and parity ($p<0.05$).

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. [4] who showed in their study that the most common placental locations in the second trimester were

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)			

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)	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)			

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)	16.41	8	0.04**
Posterior	5 (4.4)	41 (36.3)	39 (34.5)	18 (15.9)	10 (8.8)			
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

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 [5]. Intramural fibroids constitute about 62% of the total number of fibroid cases. They are located within the anterior part of the uterine wall [6]. 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 caesarean sections is carried out mainly on the anterior uterine wall which forms scar tissues thereby making it impossible for the blastocyst to implant on the anterior uterine wall and causing it to 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 a 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 ten 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 the septate uterus, bicornuate uterus, didelphic uterus and unicornuate uterus. The shape of the uterus could cause a 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 [7].

The placental location has been shown not to be associated with differences in newborn weight or other perinatal outcomes [8], whereas an association was observed between different placental locations and fetal weights in the initial phase of the third trimester however in rest of the third trimester an insignificant association was observed between the two variables [9]. 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 [2] 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 ($p>0.05$). This contrasted with Zia [2] 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 ($p>0.05$). This could be attributed to the fact that genotype is a single gene Mendelian inheritance and the 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 ($p<0.05$). 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 has shown that the location of the placenta cannot be determined by those mentioned factors.

4. CONCLUSION

The placental location has no relationship with the blood group, genotype and gestational age but does with parity. Anterior and posterior placenta locations were predominant among the parous women in Port Harcourt whereas fundal was the least. Similarly, most of the women belonged to blood group O followed by A while AB was the least. Genotype AA was the most

dominant followed by AS whereas SS genotype was the least. Predictability of placental location using maternal age, gestational age, blood group and genotype is impossible. This, however, could be peculiar to Port Harcourt women. We, therefore, recommend that further studies be carried out in other populations. This finding can serve as a reference for future research. Also, we suggest that it would be useful for further studies evaluating the relationship between foetal and newborn weight be undertaken.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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