MATERNAL AND NEWBORN ABO BLOOD PHENOTYPE PAIRS AND GIVING SPONTANEOUS PRETERM BIRTH [+]

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Abstract:

Preterm birth is defined as delivery of baby before 37 completed weeks of pregnancy. Preterm birth can be classified in to :Extremely preterm birth (<28 weeks) , very preterm birth (28-<32 weeks) and moderate to late preterm birth (32-<37 weeks) .
This study tries to detect the association between spontaneous preterm birthand maternal-newborn ABO blood group phenotypes pairs.
An analytic prospective cases control study 1:1 for a sample 524 , involve 262 preterm babies (cases) compared with 262 full term babies up to the age of 1 year (control), in this study gathering information done by direct interview with the women using a designed questionnaire form and medical records, the study was conducted during the period extended from the 13th of November 2012 to 1st of April 2013 in four governmental hospitals and four health centers in Baghdad .
All women and their babies were distributed according to maternal –newborn ABO blood group phenotypes pairs ,a combination of maternal –newborn A-A,B-B,O-O,AB-AB pairs are used as the reference group .
Distribution of women and their babies according to the maternal –newborn ABO phenotypes pairs showed significant association between maternal- new bornA-O pairs and spontaneous preterm delivery with p-value <0.05.
Spontaneous preterm birth is associated with maternal- newborn A-O pairs .This finding requires further prospective analytic study with a large sample size to confirm this result.

Keywords: **Preterm birth; Spontaneous preterm birth**

فصيلة الدم ABO لكل من الأم والطفل وحدوث الولادة المبكرة التلقائية

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المستخلص:

الولادة المبكرة : هي الولادة التي تتم قبل إتمام الأسبوع الـ 37 من فترة الحمل وتقسم الولادات المبكرة الى ثلاثة أقسام، وهي :- الولادة المبكرة للغاية وهي اقل من 28 اسبوع ،الولادة المبكرة جدا وتتراوح بين 28-<32 أسبوع و الولادة المعتدلة إلى أواخر الولادة وتمتد من 32- اقل من 37 اسبوع.تهدف الدراسة إلى دراسة العلاقة بين الولادة المبكرة التلقائية مع ازدواج فصائل الدم لكل من الأم والطفل ABO.تعد هذه الدراسة دراسة حالات وشواهد مستقبلية بمعدل 1:1 وبحجم عينة مقداره 524 حالة ،تشتمل على 262 حالة ولادة مبكرة تتضمن كل من الأم والطفل , و 262

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حالة لولادة متممة لفترة الحمل لحد السنة الأولى من عمر الطفل وهي مجموعة الشاهد و تتضمن كل من الأم والطفل ايضا. تم جمع جميع البيانات بواسطة اللقاء المباشر بالأم من خلال استمارة الاستبيان المصممة خصيصا لهذا الغرض وأيضا من خلال السجلات الطبية . كماتم اعتماد مجموعة ازدواج الدم لكل من الام والطفل ,A→A , AB→AB ,B→B,O→Oكمجموعة المرجع .وامتدت هذه الدراسة في الفترة ما بين الثالث عشر من تشرين الثاني 2012 إلى الأول من نيسان 2013 .أظهرت نتائج هذه الدراسة أن الولادة المبكرة قد ترافقت مع ازدواج فصائل الدم A→O لكل من الأم والطفل مع قيمة احتمالية اقل من 0.05 وتحتاج هذه النتيجة الى دراسات اخرى وبحجم عينة اكبر للتأكد من هذه النتيجة.

Introduction :

Preterm birth is defined as delivery of a baby before 37 completed weeks of pregnancy .Legally , in the United kingdom ,the 1993 Amendment to the Infant Life Preservation act defined the limit of viability as 24 weeks .However , a small number of infants born at 23 weeks will survive . mortality and morbidity in preterm babies born after 32 weeks' gestation is similar to that of babies born at term .The risk of neonatal mortality or survival with handicap becomes significant in very preterm infants ,defined as those born between28 and 32 weeks , but is the most significant in extremely preterm infants defined as those born before 28 weeks[1] .

The precise role of events linked to an increased risk of preterm birth is largely unknown, but decidual hemorrhage, mechanical factors, hormonal changes and cervicovaginal infections have been associated with the pathophysiology of preterm birth [2, 3, 4]. The incidence of pre-term birth is rapidly growing, partly because today it includes some cases that in the past resulted in second trimester "late" abortions. The increase in industrialized countries is strongly linked to the rise of maternal age and of the number of pregnancies following assisted reproductive treatments as well as to the introduction of new risk factors related to life style [5, 6, 7].

Red blood cell antigen in the ABO are well developed in early intrauterine life. Antigen expression on the fetal red cell can be detected by 5-7 weeks gestation and expression remains constant for all remainder of intrauterine development. Although A and B antigen are present early in utero production of A and B isoagglutinins occurs much later. By 30-34 weeks gestation ,however ,approximately 50% of infants have some measurable anti A or anti B antibodies the fetal production of such antibodies is not related to maternal ABO blood type [8].

Materials & Methods :

An analytic prospective cases control study 1:1 for a sample 524 , involve 262 preterm babies (cases) compared with 262 full term babies up to the age of 1 year (control), in this study gathering information done by direct interview with the women using a designed questionnaire form and medical records, the study was conducted during the period extended from the 13th of November 2012 to 1st of April 2013 in four governmental hospitals which are(Al-Yarmouk teaching hospital– Al-kadhimiya teaching hospital) in Al-Karch directorate and (Al-Nuaman- Baghdad teaching hospital) in Al-Russafa directorate and Three health centers in Baghdad.

Sampling design :

All spontaneous preterm life babies in intensive care and their mothers in the study settings during the study periods were included.

Criteria for selection of cases :

- Inclusion criteria :
  - Spontaneous preterm life babies who are admitted to the study hospitals with their mothers .
- Exclusion criteria :
  - Dead preterm babies were excluded from this study .

The Control group :

Full term babies up to the age of one year with their mothers attending the study hospitals. Cases and controls were collected from the hospital and health centers at the same day.

Results :

Table (1) shows the number of preterm births according to maternal- newborn ABO pairs.

Table (1): Distribution of maternal –new borne ABO Pairs among spontaneous preterm and term births

Maternal – newborn ABO phenotype	Preterm Birth (n=262)	%	Full term birth (n=262)	%
A-A	49	18.7	34	12.9
A-B	6	2.3	8	3.1
A-O	22	8.3	4	1.5
A-AB	3	1.14	10	3.8
B-A	5	1.9	7	2.6
B-B	39	14.8	35	13.3
B-O	19	7.2	11	4.2
B-AB	2	0.7	7	2.6
O-A	24	9.2	19	7.2
O-B	20	7.6	45	17.1
O-O	55	20.9	61	23.3
AB-A	4	1.5	6	2.3
AB-B	6	2.2	7	2.7
AB-AB	8	3	8	3.1

Table (2) This table shows that in this study the most of gestational age of preterm babies was 32-37 weeks which represent 73.3% of study population and the second highest percentage was 21.3% of study population were preterm babies with gestational age 28-<32 weeks , the lowest percentage is 5.3% is among preterm babies with gestational age <28 weeks.

Table (2): Distribution of preterm babies according to gestational age

Gestational age	No. of preterm birth	Percent %
< 28 weeks	14	5.3
28- <32 weeks	56	21.3
32-37 weeks	192	73.3
Total No.	262	100

Table (3) This table shows the distribution of maternal- newborn ABO pairs for preterm babies and full term babies, in this study a statistically significant association has been detected between maternal-newborn blood group(A-O) Pairs and spontaneous preterm delivery (OR=5.03, p=0.0037) .

Table (3): Risk factor of maternal – newborn ABO pairs and spontaneous preterm delivery

Maternal-new born blood group	Preterm (n=262) Yes	Full term (n=262) Yes	Odds Ratio	95% CI	P .Value
A-A , B-B , O-O, AB-AB	151	138	-	-	
A-B	6	8	0.7	0.23-2.02	0.49
A-O	22	4	5.03	1.68-14.9	0.0037*
A-AB	3	10	0.27	0.07-1.02	0.05
B-A	5	7	0.6	0.2-2.1	0.47
B-O	19	11	1.6	0.7-3.4	0.25
B-AB	2	7	0.3	0.05-1.27	0.097
O-A	24	19	1.9	0.6-2.19	0.66
O-B	20	45	0.4	0.22-0.72	0.002
AB-A	4	6	0.6	0.17-2.2	0.45
AB-B	6	7	0.78	0.25-2.38	0.66

Maternal –newborn A-A , B-B , O-O, AB-AB represent the reference group .

*** Statistically significant**

Discussion :

In this study moderate to late preterm babies 32-37 represent 73.3% of study population this percentage is similar to WHO publication (Born too soon the global action on preterm birth) in 2012, according to WHO estimation of gestational age of preterm birth in 41 countries shows that the highest percentage were among moderate to late preterm babies (32-37 weeks gestational age) it was represent 84.3% of all preterm babies [9]. Supportive care can be more given to late preterm birth than very preterm and extremely preterm babies.Extremely preterm babies requires intensive, expensive care to survive because

alveolar surfactant production begins at 30-32weeks'gestation .Therefore preterm infants born prior to 30 weeks are at highest risk and most of them die after short period of birth .

If pregnant woman is exposed to fetal red cells that possess different antigens to her own red cell.(i.e the antigen inherited from the father) she will amount an immune response. The initial response is production of IgM antibodies which do not cross the placenta and therefore the pregnancy in which antibodies are first detected is unlikely to be affected However, on further exposure to the foreign red cell antigen IgG antibodies are produced ,which do across the placenta and cause fetal hemolytic anaemia[10].In this study there is great rapprochement between number of cases and non cases among male and female births in reference group (A-A,B-B,O-O,AB-AB) than other incompatible pairs, that resulted from inability of IgM from penetrating placenta barrier.

Distribution of women who have preterm delivery and full term delivery according to maternal -new born blood group ABO phenotypes pairs revealed significant association between specific pairs and spontaneous preterm delivery,this result represented that maternal new-born pairs A-O have 5.03 times greater chance to giving preterm delivery($p<0.05$), this finding disagree with a study done by Sammer Y *et al* .,2012 Saudi Arabia, which suggested that spontaneous preterm birth is associated with maternal-newborn B-A and AB-B pairs [11].

The expected risk of ABO incompatibility is the hemolytic anaemia that lead to fetal anaemia and progress to heart failure as that seen in Rh- incompatibility, that may have no direct effect on uterine contractility that need to labor. Another study need to detect any trigger from this situation ,that enhance uterine contraction and labor.This finding revealed strongly suggestion that these results weremight be due to coincidence factors, so this study need to be applied to larger study group, then submitted to Coomb's test direct and indirect by taking an umbilical artery sampling from the fetus at 28 weeks to take fetal blood and do direct Coomb's test or PCR or screen for specific IgG for ABO and their amount in correlation with later pregnancy outcome and see the results.

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