A Study of the Association of Parental Consanguinity with Birth Defects and Neonatal Medical Problems in Babylon Province

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Abstract

A cross-sectional study of 138 married couples and their offspring was done in Babylon Province from the period between the first of February till the end of April 201 6 .

The parents; who were either consanguine or no consanguine, came from mixed urban and rural backgrounds. Socio -demographic and obstetric data were recorded. Neonatal data were extracted from the medical records of the labor and neonatal care wards. The incidence of congenital and birth defects was significantly higher for those born to consanguine parents especially for first cousin couples. The incidence of congenital abnormalities in newborns of all non-consanguineous parents was 7.1% as compared to 23.2 % for newborns of all consanguineous group. In addition prematurity, history of previous prenatal mortality, and low birth weight were more common in the consanguineous group.

Keywords: Consanguinity, birth defects, neonatal medical problems, Babylon province

1. Introduction

Consanguine marriage, especially among first cousins is common place in Babylon Province in central Iraq. Consanguinity refers to the relationship between couples who have in common at least one ancestor [1]. All consanguineous marriages ranging from first to distant relatives account for well over half of all marriages in the province. This is mirrored not only in Iraq but in almost all neighboring countries [2] . Iraq is a Middle Eastern country a region where the socially acceptable marriages are between first cousins . In regions where such marriages are common up to 60% of all marriages are between close biological relatives [3]. Several studies have discussed consanguinity as a causal factor in birth defects such as a 1979 study in neighboring Iran [4].

The current study was conducted to find out the association between birth defects and medical problems among newborns of both consanguineous and non-consanguineous parents

. International studies indicate that the closer the familial relationship of the parents, the greater the chances of congenital abnormalities [5] (Gatrad 1984). The increased incidence of birth defects and medical problems in cases of inbreeding prompt the necessity of establishing intervention programs to avoid these complications in the offspring [6] .

2. Material and methods:

This study was conducted in both Al-Hilla General Teaching Hospital's neonatal special care baby unit and Babil Maternity Teaching Hospital in Babylon Governorate during the period from the first of February till the end of April 2016.

2.1. Study population:

The study included 138 neonates born to consanguine and non-consanguine parents admitted to the two hospitals. The data was gathered after consent was given, using a specially designed questionnaire in addition to information collected from the special care baby unit admission files.

2.2. Study design:

This hospital based cross-sectional (descriptive) study was carried out to elucidate the association of parental consanguinity with birth defects and neonatal medical problems and to find the relationship of parental consanguinity with study variables. The study variables included (maternal and paternal age ,residence ,educational status , baby gender, birth weight, gestational age at birth, spacing between births, type of delivery whether normal vaginal or Caesarean section,).Reasons for admission immediately after birth were also recorded including neonatal jaundice, hypoglycemia, seizures, birth asphyxia, bleeding, surgical problems and hypothermia.

2.3. Data Analysis:

SPSS version 22 was utilized. Categorical variables were presented as frequencies and percentages, Continuous variables were presented as mean and standard deviation chi square test was used to find the association between the categorical variables. P value of less than or equal to 0.05 was significant.

3. Results:

Table 1: Mean and standard deviation of current maternal age(in years)and birth weight in grams of the study population.

Variables	Mean±SD	Range
Current maternal age (year)	20.79±5.81	(15-42)
Birth weight(gm)	2530.18±534.68	(1100-4100)

From table 1 the mean age of mothers included in the study was 20.79 years and the mean birth weight was 2530.18 gm.

Table 2:Demographic and perinatal factors of neonates included in the study .

Variables	Number	Percentage(%)
Gender		
Male	67	48.6%
Female	71	51.4%
Total	138	100%
Gestational age(weeks)		
< 37 weeks	60	43.5%
37-42 weeks	70	50.7%
≥ 42 weeks	8	5.8%
Total	138	100%
Type of delivery		
Normal vaginal delivery	96	69.6%
Emergency C-section	23	16.6%
Elective C-section	19	13.8%
Total	138	100%
Number of babies		
Singleton	125	90.6%
Multiple	13	9.4%
Total	138	100%
Birth order		
First	31	22.5%
Second	57	41.3%
Third or more	50	36.2%
Total	138	100%
Spacing(years)		
< 2	61	44.2%
2-5	17	12.3%
≥ 5	40	29.0%
Primigravida	20	14.5%
Total	138	100%
Birth weight(gm)		
<2500	65	47.1%
2500-4000	70	50.7%
≥ 4000	3	2.2%
Total	138	100%

Table 2 shows that singleton females slightly outnumbered males and well over half were term births with a weight exceeding 2500 grammes. Close spacing between births was recorded in 44.2%.

Table 3: Couples Demographic and Medical Background.

Variables	Number	Percentage (%)
Mothers' age(year)		
<18	56	40.6%
18-35	75	54.3%
≥35	7	5.1%
Total	138	100%
Maternal education		
Illiterate	20	14.5%
Primary education	45	32.6%
Secondary education	56	40.6%
Higher education	17	12.3%
Total	138	100%
Current paternal age(year)		
<18	14	10.1%
≥18	124	89.9%
Total	138	100%
Paternal education		
Illiterate	10	7.3%
Primary	42	30.4%
Secondary	60	43.5%
Higher education	26	18.8%
Total	138	100%
Residence		
Rural	86	62.3%
Urban	52	37.7%
Total	138	100%
Previous sibling deaths		
Yes	29	21.0%
No	109	79.0%
Total	138	100%
Previous preterm deaths		
Yes	42	30.4%
No	96	69.6%
Total	138	100%
Maternal past medical history		
Yes	35	25.4%
No	103	74.6%
Total	138	100%
Paternal past medical history		
Yes	33	23.9%
No	105	76.1%
Total	138	100%

Table 3: shows the demographic and medical characteristics of couples included in the study. Three quarters had either a primary or secondary level of education coming from a mixed urban and rural background. Most of them were healthy and around one quarter reported a history of previous sibling death, abortion or preterm birth.

Table 4: Reasons for hospitalization in the neonatal period.

Reasons for hospitalization	Number	Percentage (%)
Neonatal seizures	7	5.07%
Neonatal jaundice	45	32.65%
Neonatal asphyxia	11	7.97%
Respiratory distress syndrome(RDS) with or without congenital heart disease	39	28.26%
Inborn error of metabolism	2	1.44%
Surgical problem(intestinal obstruction)	3	2.17%
Hypoglycemia	19	13.76%
First day (pathological) jaundice	6	4.34%
Hemolytic disease of newborn	1	0.72%
Hypothermia	5	3.62%
Total	138	100%

Table 4 shows that the majority of neonates included in the study were admitted to treat neonatal jaundice and respiratory distress, both accounting for half of all reasons. Hypoglycemia came third as the most common reason.

Table 5: Association between consanguinity and demographic characteristics of neonates.

Variables	Consanguinity		Total	Chi square	P-value
	Consanguine	Non consanguine			
Gestational age (weeks)					
< 37	48(58.5%)	12(21.4%)	60(43.5%)		**<0.001*f**
37-42	29(35.4%)	41(73.2%)	70(50.7%)		
≥ 42	5(6.1%)	3(5.4%)	8(5.8%)		
Total	82(100%)	56(100%)	138(100%)		
Number of baby					
Singleton	73(89.0%)	52(92.9%)	125(90.6%)	0.573	0.449
Multiple	9(11.0%)	4(7.1%)	13(9.4%)		
Total	82(100%)	56(100%)	138(100%)		
Spacing(years)					
<2	43(52.4%)	18(32.1%)	61(44.2%)	6.849	0.077
2-5	18(22.0%)	22(39.3%)	40(29.0%)		
≥5	9(11.0%)	8(14.3%)	17(12.3%)		
Primi	12(14.6%)	8(14.3%)	20(14.5%)		
Total	82(100%)	56(100%)	138(100%)		
Birth weight (gm)					
<2500	49(59.8%)	16(28.6%)	65(47.1%)		**<0.001*f**
2500-4000	33(40.2%)	37(66.0%)	70(50.7%)		
≥4000	0(0.0%)	3(5.4%)	3(2.2%)		
Total	82(100%)	56(100%)	138(100%)		
Birth defect**					
Present	19(23.2%)	4(7.1%)	23(16.7%)	6.155	**0.013***
Absent	63(76.8%)	52(92.9%)	115(83.3%)		
Total	82(100%)	56(100%)	138(100%)		

***p value ≤ 0.05 was significant, f:fisher exact test**

****Congenital heart disease, Spinal dysraphism, Skeletal dysplasia etc.**

Table 5 shows a significant association between consanguinity and gestational age, birth defect and low birth weight with p value being ≤ 0.05.

Table 6: Association between consanguinity and demographic characteristics of the parents.

Variables	Consanguinity		Total	Chi square	P value
	consanguine	Non consanguine			
Current maternal age(years)					
< 18	30(36.5%)	26(46.4%)	56(40.6%)		0.263[f]
18-35	49(59.8%)	26(46.4%)	75(54.3%)		
≥ 35	3(3.7%)	4(7.2%)	7(5.1%)		
Total	82(100%)	56(100%)	138(100%)		
Current paternal age (year)					
<18	10(12.2%)	4(7.1%)	14(10.1%)	0.932	0.334
≥18	72(87.8%)	52(92.9%)	124(89.9%)		
Total	82(100%)	56(100%)	138(100%)		
Residence					
Rural	70(85.4%)	16(28.6%)	86(62.3%)	45.708	**<0.001***
Urban	12(14.6%)	40(71.4%)	52(37.7%)		
Total	82(100%)	56(100.0%)	138(100%)		
Previous sibling deaths					
Yes	25(30.5%)	4(7.1%)	29(21.0%)	10.926	**0.001***
No	57(69.5%)	52(92.9%)	109(79.0)		
Total	28(100.0%)	56(100.0%)	138(100.0%)		
Previous preterm birth					
Yes	32(39.0%)	10(17.9%)	42(30.4%)	7.042	**0.008***
No	50(61.0%)	46(82.1%)	96(69.6%)		
Total	82(100%)	56(100%)	138(100%)		

***p value ≤ 0.05 was significant**

Table 6 shows a significant association between consanguinity and a positive history of preterm births , sibling death and residence.

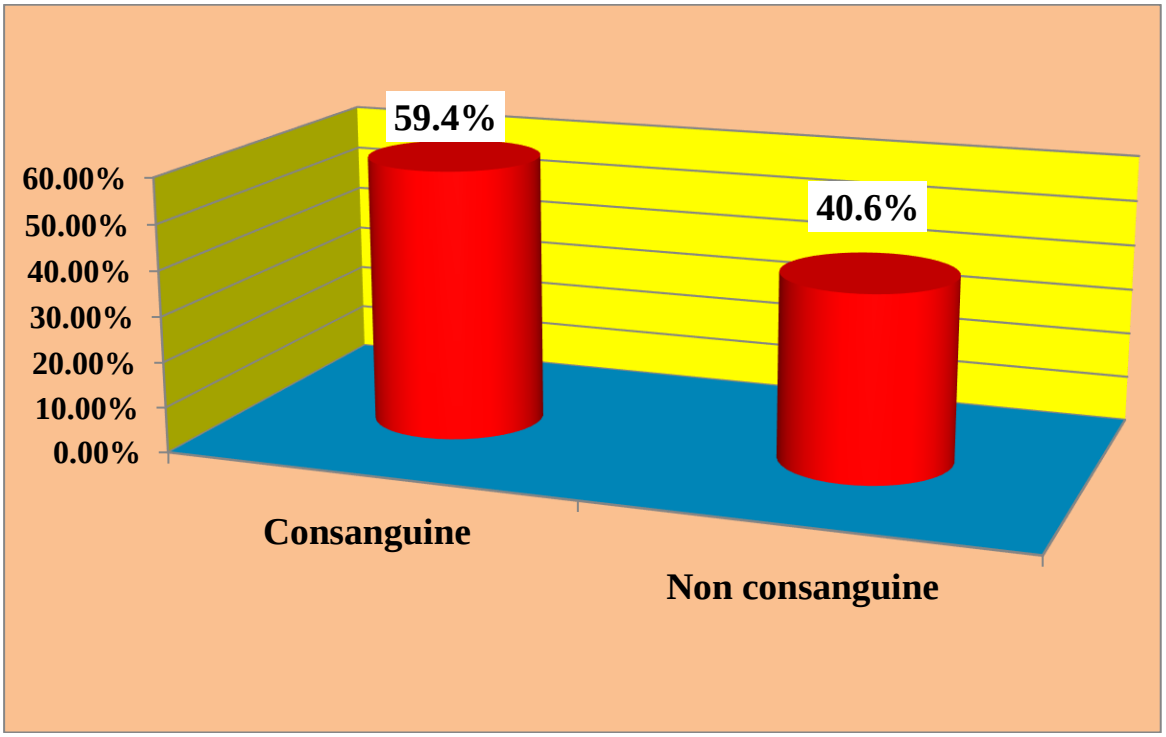

Figure 1: Distribution of couples according to consanguinity.

Figure 1 indicates that consanguine couples outweigh those who are non-consanguine.

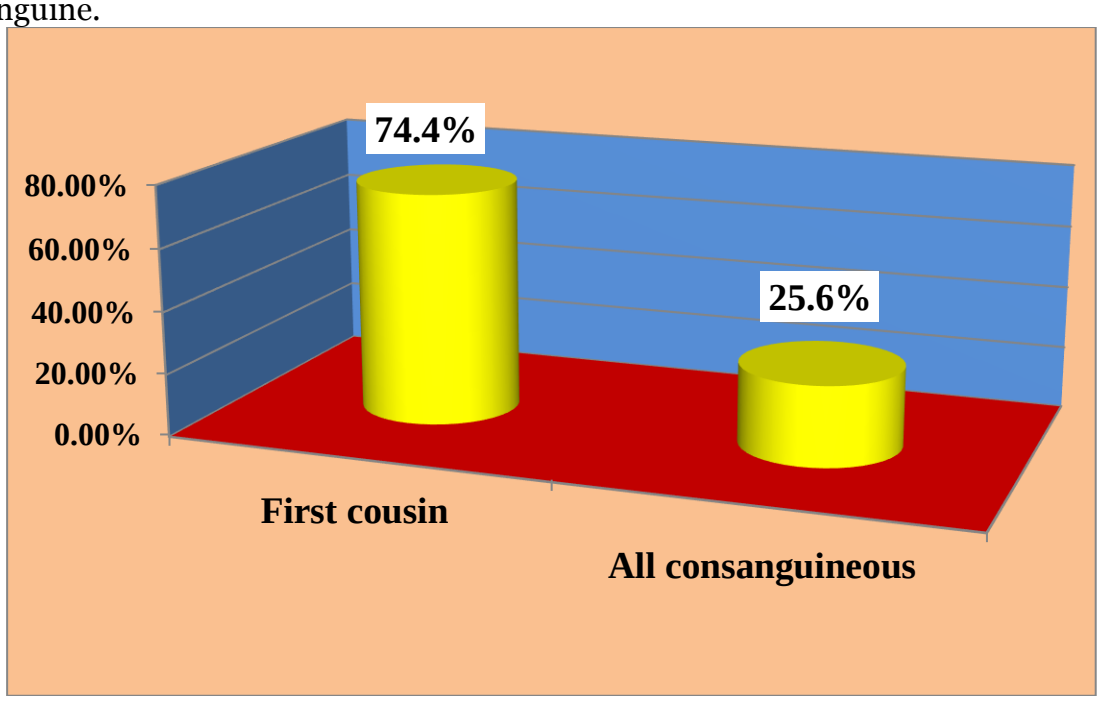

Figure 2:Distribution of consanguine couples according to the degree of consanguinity (n=82).

Figure 2 shows that being first cousins accounted for 74.4% of all consanguine couples.

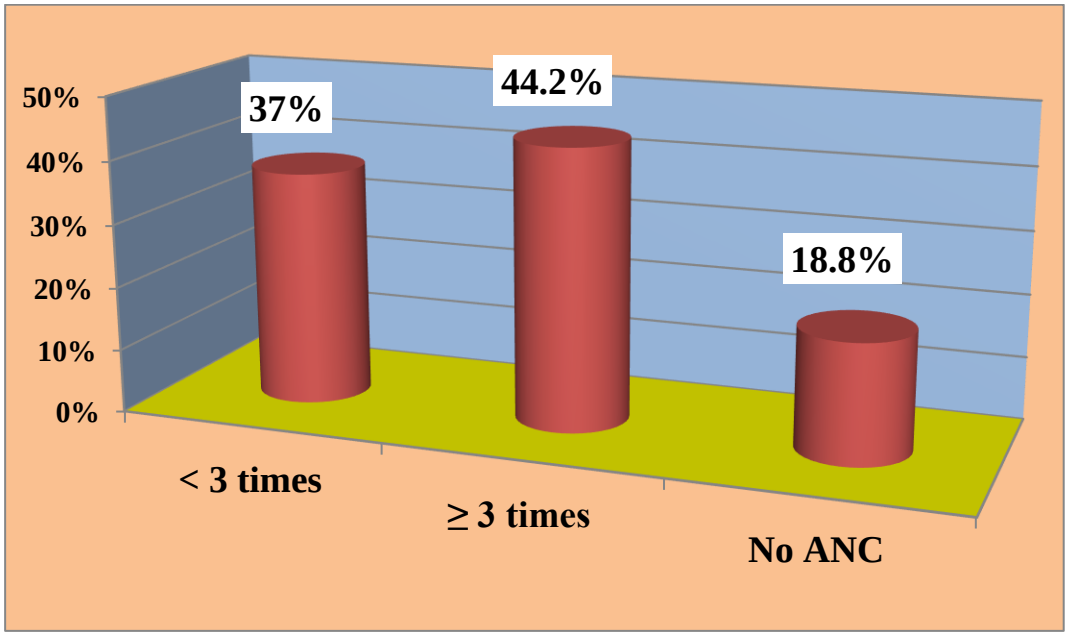

Figure 3: Frequency of antenatal care.

Figure 3 shows that four fifths of mothers had some form of antenatal care.

4. Discussion

Consanguine marriage, the union between two persons with a common ancestor, impacts the genetic makeup of the offspring of this type of marriage [7] . In the West unlike the Middle East this type of marriage is frowned upon and discouraged .It is generally regarded with suspicion , reflecting theological and age old prejudice [8]. In our local population in Iraq, there is a strong social support for consanguineous marriages, almost always between first cousins, and marriage outside the tribe or clan is perceived as a risky decision and a disruptive option. In neighboring Saudi Arabia a study was done on over three thousand families to obtain the prevalence of such marriages. Well over 57% of the families were consanguineous. One third of all such marriages was between first cousins (28.4%), distant relative marriages (15%) came second place and second cousin marriages (14%) came third [9]. The increasing importance of the genetic contribution to the overall disease profile in both developed and developing countries has highlighted potential problems associated with detrimental gene expression in consanguineous marriages [10] . International studies indicate the risk for birth defects in the offspring of first cousin parents is substantially higher than in the offspring of non-consanguineous parents. First cousins have a higher rate than those unrelated (up to triple the chance for malformations at birth and 4.4% for pre-reproductive mortality) [11].Our study found out that there is a significant association between being related and the risk of birth defects. The risk of such defects exceeded twenty percent for consanguine couples. Our findings are in agreement with international studies that indicate children of first-cousin marriages have a substantial risk of genetic disorders

(although scientists contend this is relatively small of six percent, compared with three percent risk for children whose parents are genetically not related to each other) [12].

In Babylon province, there is a tendency for early marriage. The mean age of mothers included in the study was 20.79 years and the mean birth weight was 2530.18 grammes. The younger the age of the mother the more likely that she gives birth to a low birth weight child as is the likelihood for increased risk of medical problems and birth defects. A recent study concludes that women who are part of consanguinos marriages tend to be younger than those women who are unrelated to their husbands [13] .

Some of the important socio-demographic characteristics of newborn infants were tackled in the study. The study shows that singleton females slightly outnumbered males and well over half were term births with a weight exceeding 2500 grammes. Close spacing between births was recorded in 44.2%. An international study stated that mothers who are related to their husbands they tend to have birth intervals less as there is a tendency for close spacing between births [14].

The study tackled the demographic and medical characteristics of couples included in the study. Although consanguine couples in Babylon came from a mixed urban and rural background the latter tended to be more common. Similar international studies are in agreement that more consanguineous couples tend to come from a rural background. A significant percentage of consanguine couples came from a rural habitat [15] . Three quarters of mothers in our study had either a primary or secondary level of education .An international study followed the implications of a multitude of mainly social factors, including mothers' academic achievement, and household numbers in relation to prevalence of consanguineous unions .The same study shows that a change in the types of marriage away from next of kins globally will substantially reduce homozygosity [16] . Most of the mothers in our study were healthy having some form of private and public antenatal care and follow up but that around one quarter reported a history of previous sibling death, abortion or preterm birth. Consanguinity is associated with increased gross fertility, due at least in part to younger maternal age at first live birth. Morbidity and mortality also may be elevated, resulting in comparable numbers of surviving offspring in consanguineous and no consanguineous families [17] .

Our study shows that the majority of neonates included in the study were admitted for treatment of neonatal jaundice and respiratory distress with or without associated congenital heart disease, both accounting for half of all reasons for admission in the immediate neonatal period. Regarding congenital heart disease a recent study indicated that infants born to first cousin marriages had a 1.8 times higher risk of having a congenital heart disease diagnosed at birth compared to those born to unrelated parents (95% CI: 1.1–3.1). In particular, first-cousin marriage was a significant risk factor [18].

The study demonstrated a significant association between consanguinity and prematurity and low birth weight with p value being less than or equal to 0.05.Prematurity and birth weight contribute to a high rate of morbidity and mortality among infants in the local community in Babylon Province. An international study showed that

mortality in first-cousin progeny is around 5% higher than in non consanguineous off-spring, although demographic, social, and economic factors can significantly influence the

outcome [19] .

5. Recommendations

The study recommends

1-Effective genetic counseling at local health institutions.

2-A concerted effort to identify consanguine couples at increased risk, and to provide them with risk information and carrier testing when feasible.

3-Provision of effective neonatal screening tools for genetic disorders at the two major maternity unity in Hillah the provincial capital.

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الخلاصة

شملت هذه الدراسة المقطعية 138زوج وذريتهم في محافظة بابل من الاول من شباط لغاية نهاية شهر نيسان من العام 2016 وقد كان هؤلاء الاباء والامهات خليطا من مختلف مناطق مركز محافظة بابل حيث تم اخذ المؤشرات الديموغرافية لهؤلاء الازواج كما تم اخذ المعلومات الصحية للأمهات واطفالهن وكان مصدر هذه المعلومات هي ردهات العناية بالأطفال حديثي الولادة وكذلك صالات الولادة.

وجدت الدراسة ان نسبة عيوب الخلق الولادية كانت اعلى بكثير إحصائيا الازواج الاقرباء مقارنة مع غير الاقرباء وخاصة في زيجات ابناء العم وابناء الخال حيث وجدت الدراسة ان نسبة عيوب الخلق الولادية هي 7.1% في جميع زيجات غير الاقرباء بينما كانت النسبة 23.2% في جميع زيجات الاقرباء.

وجدت الدراسة ايضا ان هنالك عوامل مساعدة في زيادة نسبة التشوهات وهي الولادات الخديجة ,وجود وفيات في الاحمال السابقة و نقص الوزن الولادي حيث كانت اكثر في زواج الاقرباء.

الكلمات المفتاحية :القرابة, عيوب الخلق ,مشاكل صحيه للأطفال حديثي الولادة, محافظه بابل