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The effect of consanguinity on reproductive outcomes in Maternity Teaching Hospital in Erbil city

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Abstract

Background and objectives: Consanguinity is a wide spread practice, increases the incidence of multifactorial disorders such as diabetes, cardiovascular disorders, obesity has been associated with stillbirths, low birth weight, preterm delivery, abortion, infant and child mortality, congenital birth defects and malformations. The objective of this study is to evaluate the impact of consanguinity on maternal and neonatal health measurement.

Methods: This case control study was carried out in Maternity Teaching Hospital in Erbil city, Kurdistan region, Iraq. The study duration was from 1st April 2020 to 1st April 2021. Data obtained from group I, two hundred fifty women had consanguineous marriage and group II, 250 women had non consanguineous marriage, regarding their pregnancy outcomes such as full term or premature live birth or still birth and miscarriage and any obvious congenital malformation.

Results: The mean age of women of Group I (26.9 years) was significantly less than the mean age of women of group II (28.1 years). No significant differences were detected between the two study groups regarding the gestational age ,parity, antenatal care, stillbirth, miscarriage and rate of preterm deliveries. The rate of Cesarean section in Group I (26.8%) was significantly less than the rate of Group II (37.2%).

Conclusions: Pregnant women with history of consanguinity had lower mean age than those without consanguinity without important differences in their parity, educational level and mean gestational age. Consanguinity had not resulted in increased rates of stillbirth, preterm labor, miscarriages or twin pregnancies in the studied sample.

Key words: Congenital malformation, Consanguinity, Infant mortality, Reproductive loss.

Introduction

Reproduction among kin is fairly common in several human societies and is favored for socioeconomic purposes.[1] Relationship between two close relative or genetically similar persons is called consanguineous marriage.[2] Rates of consanguineous marriages (CM) are variable across the globe. In the U.S., consanguineous marriages are legally prohibited in most states. In Europe, consanguineous marriages levels are lesser than 0.5 percent. In the Arabian Peninsula, several studies have recorded a level of further than 50 percent in Saudi Arabia, Oman, and the U.A.E.[3] Genetic disorders are a significant challenge on wellbeing in many nations around the globe and nearly 400 genetic disorders have been reported with consanguineous marriage mainly of autosomal recessive inheritance.[4] Information of consanguinity health consequences is important to health care practitioners delivering medical diagnostic treatments and primary care providers to aid consanguine partners in making rational family planning judgments.[5] Consanguineous marriage implies mating between two people who have the identical

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inherited background and this pedigree is generally seen as no distant than the second cousin marriage. Non-consanguinity is described as the offspring of spouses whom are unrelated for at least more than two generations.[6] The word consanguinity shouldn't be mistaken for the word endogamy; the practice of matrimony inside a certain group or culture.[7] The consanguine mating involves many types including: double first cousins, first cousins, first cousin once removed, and second cousins; while the non-consanguine mating involves: second cousin once removed, distantly related, and non-related.[8] First cousin marriage, particularly to a parent nephew's, is the popular form of consanguine marriage in Islamic nations.[9] Researches demonstrated that the main prevalent type of consanguinity is among first cousins and since over fifty per cent of the consanguine unions occur in Egypt between the first cousins, one-quarter is prevalent in Jordan and 80% of consanguine marriages between first cousins take place in South-Asia, such as Pakistan.[10] Some studies found that 40 percent of consanguine had history of congenital malformations or genetic defects, for example, in Vienna with the historical consanguinity incidence of less than 1percent.[11]Consanguinity was studied as a potential cause for congenital cardiac abnormalities, inborn errors of metabolism, miscarriage, death from stillborn birth, mortality in children under 5, deafness, extreme developmental and neurological failure, Down, pre-mature apnea, visual impairments; pre-reproductive death, dementia, breast cancer and other abnormality. Despite the exception of conditions, which are unquestionably autosomal recessive disorders, there were few clear compelling findings.[12] Consanguine partnerships are assumed possess sociocultural benefits such as secure parental relations, reduction in parents' economic issues risks, simple marriage obligations, less domestic violence and lesser divorce rates.[13] Such partnerships also protect family properties as well as possessions and more financial stability inside the same citizen's community. A couple is usually thought to be quite functional if married since they are having similar social beliefs and rituals.[14] In humans, several communities with increased rates of consanguine partnerships were found to be amongst the communities with the most frequently used portions of their genomes.[15] The purpose of this thesis is to examine, analyze and assess the effect of inbreeding on childbirth and if it is related to pregnancy loss or preterm birth and fetal growth restriction. Another objective is to find out the congenital malformations' incidence in the children of consanguine spouses.

Subjects and methods

A control case study carried out in Maternity Teaching Hospital in Erbil city, Kurdistan region, Iraq. The study duration was from 1st April 2020 to 1st April 2021. It included 500 pregnant women who were admitted for delivery either vaginally or by cesarean section or were admitted due to miscarriage. Data obtained from two hundred fifty women who had consanguineous marriage and 250 women had non consanguineous marriage, regarding their full term or premature live birth or still birth and abortion or any obvious congenital malformation. The inclusion criteria included pregnant ladies (16y-35y), any parity, any gestational age, singleton and multiple pregnancies. The exclusion criteria included any pregnant lady > 35 years, polycystic ovarian syndrome, diabetes mellitus, hypertension, hypothyroidism, thrombophilia, uterine fibroid, uterine anomaly (didelphys, septate uterus, bicornoate uterus) and cervical incompetence. The consanguineous "consanguinity is the marriage between close-kin or blood relation"[16] and non- consanguineous patients were recruited from labor room, operation theatre and from emergency department after detailed history and

examination. The data were obtained from patients themselves by direct interview using a specially designed questionnaire after explanation and obtaining written informed consent from each participant. All participant was assured that confidentially would be maintained and their information would only be used for research purposes. The parity was classified as primipara, multiparas (1-4), grand multiparas (≥5) An expert neonatologist evaluated all neonates in the week following birth. Perinatal outcomes included (full term delivery, preterm delivery, obvious congenital malformation, miscarriage and stillbirth). Extremely preterm labor was defined as < 28 weeks of gestation, very preterm (28 to < 32 weeks) and late preterm (32 to < 37 weeks) gestation.[17] Stillbirth, is typically defined as fetal death at or after 28 weeks of gestation, during or before birth, it results in a baby born without sings of life.[18, 19] Miscarriage, is spontaneous abortion and pregnancy loss, it is the natural loss of an embryo or fetus before is able to survive, independently before 24 weeks gestation.[20] The gestational age was calculated by the first day of menstrual cycle and according to the first trimester ultrasound estimation.[21] The families were divided into consanguineous and non-consanguineous; the consanguineous group was further subdivided into 1st cousin marriage and the marriage between distant relatives. Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Chi square test of association was used to compare proportions. Fisher's exact test was used when the expected frequency (value) was less than 5 of more than 20% of the cells of the table. Student's t-test of two independent samples (unpaired t test) was used to compare means of two samples. A p-value of ≤ 0.05 was considered as statistically significant. The Ethics and Scientific Committee of the Kurdistan Board of Medical Specialties approved this study. Written informed consent was obtained from each woman who agreed to participate in the study at the time of the first interview. All participants were assured that their information would be kept confidential and would be used for research purposes only. All interviews were carried out in accordance with the ethical standards of the institutional research committee.

Results

Two groups of women were included in the study. The mean age of women of Group I (26.9 years) was significantly (p = 0.012) less than the mean age of women of group II (28.1 years). Table (1) shows that 8% of women of Group I were aged ≥ 35 years, compared with 15.2% of women of Group II (p = 0.016). The table shows that more than half (55.4%) of the women were living in urban areas but there was no significant difference between the groups (p = 0.322). It is evident in the table that around half of the women were either illiterate or of primary education, but there was no significant difference between the groups (p = 0.830). The majority (76.8%) of the pregnancies were term pregnancy (37-42 weeks) and there was no significant difference between the two groups (p = 0.173). No significant differences were detected between the groups regarding parity (p = 0.194), and antenatal care visits (p = 0.149).

Table (1): Basic characteristics of the studied sample

	Consanguinity		No consanguinity		Total		
	No.	(%)	No.	(%)	No.	(%)	p-value
Age (years)							
< 20	17	(6.8)	9	(3.6)	26	(5.2)	
20-34	213	(85.2)	203	(81.2)	416	(83.2)	
≥ 35	20	(8.0)	38	(15.2)	58	(11.6)	0.016
Mean(±SD)	26.9	(±5.2)	28.1	(±5.6)	27.5	(±5.5)	0.012†
Residency							
Urban	133	(53.2)	144	(57.6)	277	(55.4)	
Rural	117	(46.8)	106	(42.4)	223	(44.6)	0.322
Education							
Illiterate	79	(31.6)	70	(28.0)	149	(29.8)	
Primary	55	(22.0)	52	(20.8)	107	(21.4)	
Intermediate	48	(19.2)	50	(20.0)	98	(19.6)	
Secondary	29	(11.6)	31	(12.4)	60	(12.0)	
Institute & above	39	(15.6)	47	(18.8)	86	(17.2)	0.830
Gestational age (weeks)							
< 24	40	(16.0)	32	(12.8)	72	(14.4)	
24-31	8	(3.2)	2	(0.8)	10	(2.0)	
32-36	16	(6.4)	18	(7.2)	34	(6.8)	
37-42	186	(74.4)	198	(79.2)	384	(76.8)	0.173
Parity							
Primiparous	57	(22.8)	56	(22.4)	113	(22.6)	
Multiparous	161	64.4)	174	(69.6)	335	(67.0)	
Grand-multiparous	32	(12.8)	20	(8.0)	52	(10.4)	0.194
Antenatal care							
Regular	118	(47.2)	102	(40.8)	220	(44.0)	
Irregular	15	(6.0)	25	(10.0)	40	(8.0)	
None	117	(46.8)	123	(49.2)	240	(48.0)	0.149
Total	250	(100.0)	250	(100.0)	500	(100.0)	

†By unpaired t test. The other p values were calculated by the Chi square test.

It is evident in Table (2) that the rate of stillbirth was 2.4%, the rate of miscarriage was 16.4%, and the rate of preterm deliveries was 6.8%, but there were no significant differences between the two study groups (p = 0.375). No significant differences were detected between the two groups regarding the following variables: neonatal outcome (p = 0.190), twin pregnancy (p = 0.522), and history of congenital anomalies (p = 0.976). The rate of Cesarean section in Group I (26.8%) was significantly (p = 0.013) less than the rate of Group II (37.2%).

Table (2): Pregnancy outcomes in the two study groups

	Consanguinity		No consanguinity		Total		
	No.	(%)	No.	(%)	No.	(%)	p-value
Pregnancy outcomes							
Full term	181	(72.4)	191	(76.4)	372	(74.4)	
Preterm	16	(6.4)	18	(7.2)	34	(6.8)	
Miscarriage	48	(19.2)	34	(13.6)	82	(16.4)	
Stillbirth	5	(2.0)	7	(2.8)	12	(2.4)	0.375
Neonatal outcomes							
Alive baby	202	(80.8)	213	(85.2)	415	(83.0)	
Dead baby	48	(19.2)	37	(14.8)	85	(17.0)	0.190
Single/twin							

Single	237	(94.8)	240	(96.0)	477	(95.4)	
Twin	13	(5.2)	10	(4.0)	23	(4.6)	0.522
History of previous congenital anomalies							
Yes	23	(9.2)	22	(8.8)	45	(9.0)	
No	227	(90.8)	228	(91.2)	455	(91.0)	0.876
Mode of delivery							
Cesarean section	67	(26.8)	93	(37.2)	160	(32.0)	
Vaginal	183	(73.2)	157	(62.8)	340	(68.0)	0.013
Total	250	(100.0)	250	(100.0)	500	(100.0)	

When comparing the outcomes of pregnancies of women with first-degree consanguinity with the outcomes of women with second degree, Table (3) shows no significant differences between these groups regarding pregnancy outcome (p = 0.070), neonatal outcome (p = 0.871), twin pregnancies (p = 0.069), history of congenital anomalies (p = 0.894), and mode of delivery (p = 0.996).

Table (3): Pregnancy outcomes by degree of consanguinity

	First degree		Second degree		Total		
	No.	(%)	No.	(%)	No.	(%)	p-value
Pregnancy outcomes							
Full term	98	(71.0)	83	(74.1)	181	(72.4)	
Preterm	13	(9.4)	3	(2.7)	16	(6.4)	
Miscarriage	26	(18.8)	22	(19.6)	48	(19.2)	
Stillbirth	1	(0.7)	4	(3.6)	5	(2.0)	0.070*
Neonatal outcomes							
Alive	111	(80.4)	91	(81.3)	202	(80.8)	
Dead baby	27	(19.6)	21	(18.8)	48	(19.2)	0.871
Single/twin							
Single	134	(97.1)	103	(92.0)	237	(94.8)	
Twin	4	(2.9)	9	(8.0)	13	(5.2)	0.069
History of previous congenital anomalies							
Yes	13	(9.4)	10	(8.9)	23	(9.2)	
No	125	(90.6)	102	(91.1)	227	(90.8)	0.894
Mode of delivery							
Cesarean section	37	(26.8)	30	(26.8)	67	(26.8)	
Vaginal	101	(73.2)	82	(73.2)	183	(73.2)	0.996
Total	138	(100.0)	112	(100.0)	250	(100.0)	

*By Fisher's exact test. The other p values were calculated by the Chi square test.

Discussion

Upon relying on a control case study carried out in Maternity Teaching Hospital in Erbil city, Kurdistan Region and a specially designed questionnaire, we have estimated that the women with history of consanguinity were overall of younger ages and lived in rural areas. According to Alharbi, [3] one of the main reasons that consanguinity was favored among Saudi individuals was to strengthen family bonds. In a study conducted by Riaz, [8] high consanguinity was observed among the illiterate subjects compared with the literates. Our data similarly concluded evidence that consanguinity was higher, though insignificantly, among illiterate subjects. Based on a study conducted by Islam, [2] providing education for both men and women could gradually decrease the incidence of consanguinity. In this study also, women with consanguineous marriages seemed to deal with a higher likelihood of having a miscarriage (19.2%) as opposed to the women without

consanguinity dealt with a lesser likelihood (13.6%) of miscarrying their baby. Similarly, Bachir[22] found a highly significant correlation was highlighted between inbreeding and the incidence of abortion as well as post and neonatal mortality. We also discovered through our study that there was no exact relation between consanguinity and stillbirth, while a study concluded by Maghsoudlo who found that consanguineous marriage is associated with increased risk of stillbirth, particularly preterm stillbirth.[23] This study also revealed that women who engaged in consanguinity had slightly higher odds (5.2%) of having twin babies compared to women who didn't engage in relative marriage, while in a study by Bittles[24] consanguinity exerted no effect on twinning. The highly anticipated answer to the question; "does consanguineous marriage increase the chances of possible congenital anomalies?" was revealed in this study that the babies of the women with consanguineous marriages seem to report a somewhat higher percentage (9.2%) of having congenital anomalies in comparison with the lesser percentage (8.8%) of babies of the women with no consanguinity and Interestingly, this study revealed that more congenital anomalies were recorded among first degree relatives (9.4%) while it stood at a percentage of 8.9% among second degree relatives still not significant statistically. Conversely, Tayebi[25] found from 45 cases with anomalies, 34 (2.8%) cases were from familial marriages, while only 11 (0.9%) cases were from non-familial marriages in which there was a significant correlation between parental marriages and the prevalence of anomaly. Whether a woman would have a caesarean section or a vaginal delivery mainly depends on the overall health and wellbeing of both the mother and the baby. This study suggested that more women without consanguinity (37.2%) underwent a cesarean section as opposed to the women with consanguinity (26.8%), with statistically significant results. Regarding the pregnancy outcomes based on whether the subjects with consanguineous marriages were first-degree relatives or second-degree relatives. According to Afzal[5] the most common consanguineous marriage was among first cousins. Based on our study, it was discovered that 74.1% of the women who engaged in second-degree consanguinity had a full-term pregnancy. On the other hand, 71% of the women who had a first-degree relationship with their spouse were reported to have a full-term pregnancy. More stillborn babies were observed in second-degree spouse relationships compared to first-degree relationships. A slightly more positive neonatal outcome with the baby being alive was recorded between second-degree relatives (81.3%) while it was 8% for first-degree relatives. Second- degree relatives seemed to have a higher chance conceiving twins compared to first-degree relatives but all these results were not empowered statistically. With regard to neonatal outcome, Hashemipour [26] discovered that there was a significant correlation between paternal consanguinity and hypothyroidism in the neonate and higher rates of congenital hypothyroidism were found among neonates of first-degree than second-degree cousins.

Conclusions

Pregnant women with history of consanguinity had lower mean age than those without consanguinity without important differences in their parity, educational level and mean gestational age. Consanguinity had not resulted in increased rates of stillbirth, preterm labor, miscarriages or twin pregnancies in the studied sample. Women with consanguinity delivered more frequently vaginally. Neonatal outcome and rates of congenital anomalies were not increase in neither first nor second-degree consanguinity.

Conflicts of interest

The author reports no conflicts of interest.

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