

Original Article

The effect of consanguineous marriage on reproductive wastage and Perinatal outcomes

Community
Medicine

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ABSTRACT

Background: Consanguinity refers to the biological relation between husband and wife. Consanguinity increases the probabilities of reproductive wastage, adverse perinatal outcomes and genetic disorders.

Objective: To investigate the effect of consanguineous marriage on reproductive wastage and adverse perinatal outcomes.

Methodology: This research study was conducted at Private Perinatal Diagnosis Clinic (PDC) in Cairo, Egypt. The data were retrieved from medical records of couples who attended the Clinic from the period of 2019 to 2023. Couples had a previous pregnancy wastage experience and came for pregnancy follow up and /or counseling as well. All completed medical records were included in the study. The data included socio-demographic characteristics of couples, history of consanguineous marriage, degree of consanguinity, duration of marriage, reproductive history, and history of unfavorable reproductive outcomes.

Results: History of consanguinity was reported among 49.7 % of the studied records. First cousin consanguinity was the highest (64.8%) among them, followed by 2nd cousin consanguinity (20.3%). The highest percentage of university education was reported among non-consanguineous group (57.6%) of husbands and (54.6%) of wives compared to consanguineous group (31.1% of husbands and 27.2% of wives). Consanguineous couples reported a higher proportion of pregnancy wastage (stillbirths 24%, and congenital malformation, 61.7%) and adverse reproductive outcomes including early and late neonatal deaths (26.2% and 10% respectively), infant deaths (19.6%), child deaths (14.3%), compared to non-consanguineous couples.

Conclusion: Reproductive wastage and adverse perinatal outcomes have a linkage to consanguineous marriage. Therefore, couples with pregnancy wastage problems need comprehensive follow up during pregnancy with health education tailored for them. Also, establishment of a national awareness program about the risk of consanguineous marriage with enforced application of premarital and preconception screening are strongly recommended.

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Key words: Consanguineous marriages; pregnancy wastage; congenital malformation.

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INTRODUCTION

Reproductive wastage refers to a couple's ability to conceive, but unable to produce a live birth [1]. Adverse perinatal outcomes refer to stillbirth, preterm birth, low birth weight, small for gestational age and neonatal deaths before 7 days of life [2,3]. Overall, 10.8% of women experience at least one pregnancy loss, 1.9% have two pregnancy losses and 0.7% have three pregnancy losses [4].

Consanguineous marriage is the legal union of biologically related male and female [5]. Consanguinity increases the probabilities of occurrence of the homozygosity of mutant and lethal genes [6]. In consanguineous marriages, the chances of having the

same recessive gene are significantly higher compared to non-consanguineous marriages. So, the incidence of autosomal recessive disorders is more frequent among consanguineous couples [7]. Consanguineous marriage is culturally prevalent in the Middle East, and the prevalence of spontaneous miscarriages and still births were higher among consanguineous couples [8]. Also, a higher proportion of preterm delivery and low birth weight were reported among women in consanguineous marriages [9]. Approximately, 23 million pregnancy losses occur globally each year, with a prevalence rate of 10-15% among clinically recognized pregnancies [4]. In Fayoum Governorate, the rates of adverse perinatal outcomes were 14.9% of

preterm deliveries [10]; 16.9% of low birth weight [11]. The rates of early neonatal deaths were 18/1000, infant deaths were 25/1000, and child deaths were 28/1000 [12]. Identifying the cause and risk factors of pregnancy loss and adverse perinatal outcomes can provide important diagnostic, prognostic, and management recommendations to support future viable pregnancies [13]. Accordingly, this study was conducted to investigate the impact of consanguineous marriage on reproductive wastage and adverse perinatal outcomes.

PATIENT AND METHODS

Study setting

The study was conducted at Private Perinatal Diagnosis Clinic (PDC) in Cairo, Egypt. This clinic provides counseling, screening, and diagnostic procedures to couples with history of reproductive wastage, fetal abnormalities or a familial genetic disorders or birth defects.

Study design

A retrospective study of medical records of couples attended the Clinic with a complaint of previous or current history of reproductive wastage either for follow up and /or counseling.

All completed medical records of couples who visited the Clinic in the period from 2019 to 2023 were included in the study.

Ethical consideration

Proposal Approval of this study was obtained from the Ethical Committee of the Faculty of Medicine (For Girls), Cairo, Al-Azhar University. Ethical considerations related to the recorded data such as privacy and confidentiality had been considered.

Administrative approval was taken from the selected perinatal diagnosis clinic board.

Data collection and Statistical analysis

The data retrieved from the studied records include demographic data (residence, current age, age at current marriage, duration of current marriage, history of consanguineous marriage and degree of consanguinity), socio-economic data (education and occupation), reproductive history, and history of unfavorable reproductive outcomes. Qualitative data were presented by numbers (No.) and percentages (%); quantitative data: presented by mean and standard deviation. Pearson Chi-square test (χ^2) was used in comparison of qualitative data.

RESULTS

Table (1) demonstrates the distribution of the studied couples according to sociodemographic characteristics. The mean age was 33.7±6.1 years for husbands and 28.5±5.7 years for wives with statistically significant difference between them, with 1.7% of wives still currently below 19 years old. Regarding origin, more than one quarter of all studied couples both husbands and wives (26.6% and 26.1% respectively) were from North Upper Egypt. Meanwhile, more than half of all the studied couples (53.3%) were living in urban areas. Adding, 44.9% of husbands and 41% of wives were university educated and the vast majority of the studied husbands were working while, most of wives were housewives. Figure (1) demonstrates that 49.7% of studied couples were in consanguineous marriage. Figure (2) demonstrates that 1st cousin marriage was the predominant degree of consanguinity.

Table (1): Distribution of the studied couples according to sociodemographic characteristics

Items	Husbands	Wives
Current age: Mean ± SD years	33.7±6.1	28.5±5.7
Origin: no. (%)		
- North upper Egypt	306 (26.6%)	299 (26.1%)
- Greater Cairo	248 (21.6%)	263 (22.9%)
- Delta	206 (17.9 %)	206 (17.9%)
- Southern upper Egypt	182 (15.8%)	176 (15.3%)
- Central upper Egypt	110 (9.6%)	99 (8.6%)
- Suez Canal	58 (5.1%)	57 (5.8%)
- Alexandria	39 (3.4%)	39 (3.4%)
Residence: no. (%)		
- Urban	613 (53.3%)	
- Rural	537 (46.7%)	
Education: no. (%)		
- Illiterate/ read & write	45 (4.0%)	67 (5.8%)
- Primary	16 (1.4%)	44 (3.8%)
- Preparatory	60 (5.2%)	114 (9.9%)
- Secondary	512 (44.5%)	454 (39.5%)
- University and postgraduate	517 (44.9%)	471 (41.0%)
Working condition: no. (%)		
- Not working for cash	3 (0.3%)	880 (76.5%)
- Working for cash	1147 (99.7%)	270 (23.5%)

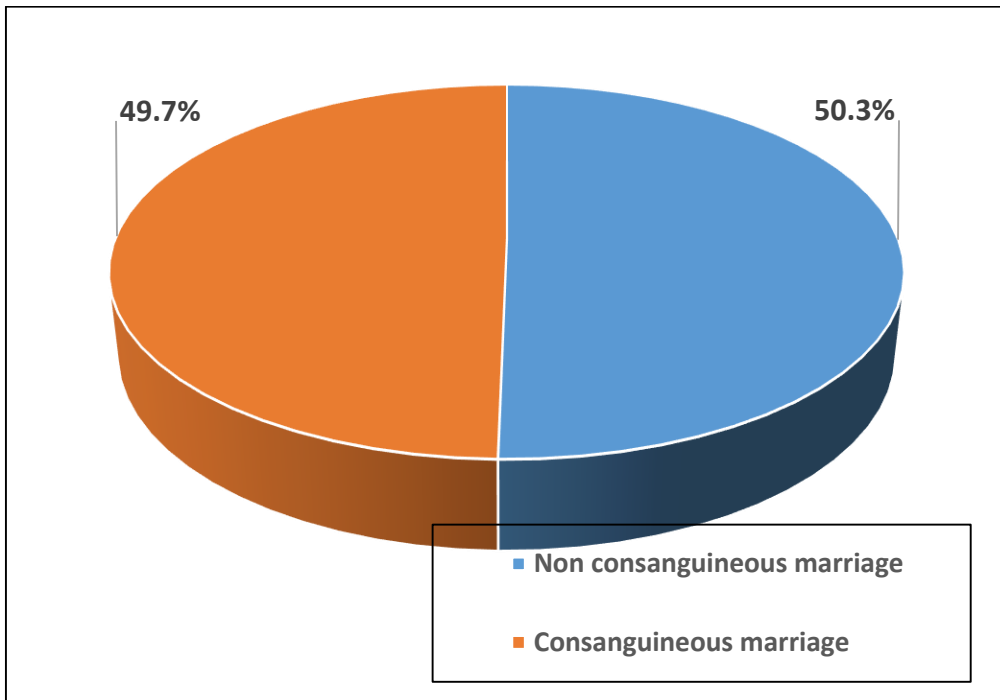


Figure (1): History of consanguinity among the studied couples

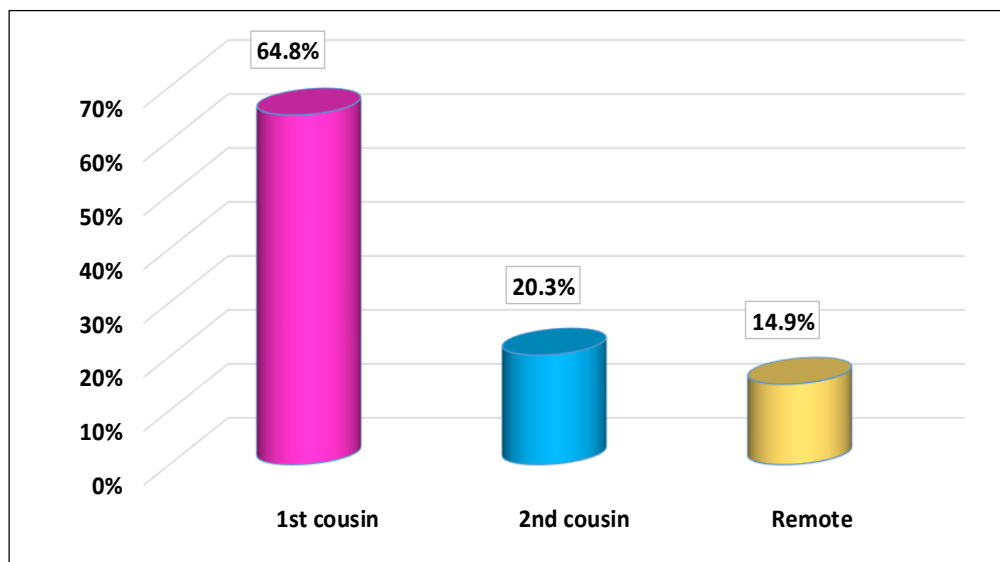


Figure (2): Degrees of consanguinity among consanguineous couples

Table (2) demonstrates sociodemographic characteristics of studied husbands according to consanguinity status. Majority of the studied wives of consanguineous and non-consanguineous groups aged from 19y-35y (89.3% and 82.5%, respectively). More than one third (37.4%) of consanguineous wives' vs 15.4% of non-consanguineous wives were married at age of ≤ 18 y. More than one third (34.3%) of consanguineous group (both husbands and wives) were from North upper Egypt while more than one quarter of non-consanguineous group (25.3% husbands and 27.7% wives) were from Greater Cairo region. Also, 67.1% of consanguineous group were residing in urban areas compared to 60.4% of non-consanguineous group were residing in rural areas. The highest percentage of university education was reported among non-consanguineous group (57.6% of husbands and

54.6% of wives) compared to consanguineous group (31.1% of husbands and 27.2% of wives). Most husbands of both groups were working (99.7 % and 99.8%, respectively) while 34.4% of wives of non-consanguineous marriage were working.

Table (3) illustrates unfavorable reproductive outcomes among the studied couples according to consanguinity status. Couples of consanguineous marriages reported the highest percentage regarding early and late neonatal deaths, infant deaths, child deaths and congenital malformations (26.2%, 10% 19.6%, 14.3% and 61.7%, respectively) with statistically significant difference between the two comparative groups. On the other hand, non-consanguineous group reported the highest percentage

of recurrent abortions (52.6%) with statistically significant difference between them.

Table (2): Sociodemographic characteristics of studied couples according to consanguinity status

Items	Consanguineous marriage n= 572		Non consanguineous marriage n=578	
	Husbands no. (%)	Wives no. (%)	Husbands no. (%)	Wives no. (%)
Age currently: no. (%)				
- ≤18y	--	15 (2.6%)	--	5 (0.9%)
- 19 y -35y	418 (73.1%)	511 (89.3%)	354 (61.2%)	477 (82.5%)
- >35y	154 (26.9%)	46 (8.1%)	224 (38.8%)	96 (16.6%)
Age currently: Mean ±SD years	32.9±5.5	27.2±5.4	34.5±6.5	29.8±5.7
Age at current marriage: no. (%)				
- ≤18y	7 (1.2%)	214 (37.4%)	3 (0.5%)	89 (15.4%)
- 19 y -35y	560 (97.9%)	357 (62.4%)	562 (91.0%)	472 (81.7%)
- >35y	5 (0.9%)	1 (0.2%)	49 (8.5%)	17 (2.9%)
Age at current marriage: Mean ±SD years	25.7±3.7	20.1 ± 3.7	28.4±5.4	23.7±5.1
Duration of current marriage: no. (%)				
- < 1y	4 (0.7%)		14 (2.4%)	
- 1-10y	443 (77.4%)		470 (81.3%)	
- > 10y	125 (21.9%)		94 (16.3%)	
Residence: no. (%)				
- Urban	384 (67.1%)		229 (39.6%)	
- Rural	188 (32.9%)		349 (60.4%)	
Education: no. (%)				
- Illiterate/ read and write	33 (5.7%)	46 (8.0%)	12 (2.1%)	21 (3.6%)
- Primary	13 (2.3%)	30 (5.2%)	3 (0.5%)	14 (2.5%)
- Preparatory	42 (7.5%)	76 (13.3%)	18 (3.1%)	38 (6.6%)
- Secondary	300 (52.4%)	265 (46.3%)	212 (36.7%)	189 (32.7%)
- University and postgraduate	184 (31.1%)	155(27.2%)	333 (57.6%)	256 (54.6%)
Working condition: no. (%)				
- Not working for cash	2 (0.3%)	501 (87.6%)	1 (0.2%)	379 (65.6%)
- Working for cash	570 (99.7%)	71 (12.4%)	577(99.8%)	199 (34.4%)

Table (3): Distribution of unfavorable reproductive outcomes among the studied couples according to consanguinity status

Types of unfavorable outcomes	Consanguineous marriage n=572 no. (%)	Non consanguineous marriage n=578 no. (%)	Stat. test	p-value
1. Reproductive wastage and perinatal outcomes				
- Abortions				
Once	106 (18.5%)	115 (19.9%)	$\chi^2=37.80$	p=0.001*
Recurrent	213 (37.3%)	304 (52.6%)		
- Still births	137 (24.0%)	125 (21.6%)	$\chi^2=0.88$	p=0.347
- Preterm deliveries	58 (10.1%)	59 (10.2%)	$\chi^2=0.001$	p=0.970
- Low birth weight	20 (3.5%)	10 (1.7%)	$\chi^2=3.53$	p=0.06
- Small for gestational age	6 (1.0%)	10 (1.7%)	$\chi^2=0.97$	p=0.324
- Early neonatal deaths	150 (26.2%)	100 (17.3%)	$\chi^2=13.45$	p=0.001*
2. Other unfavorable outcomes				
- Late neonatal deaths	57 (10.0%)	35 (6.1%)	$\chi^2=5.97$	p=0.015*
- Infant deaths	112 (19.6%)	35 (6.1%)	$\chi^2=47.17$	p=0.001*
- Child deaths	82 (14.3%)	32 (5.5%)	$\chi^2=24.92$	p=0.001*
- Congenital malformation	353 (61.7%)	181 (31.3%)	$\chi^2=106.80$	p=0.001*

N.B. Total exceeded 100% as the couple may experience more than one of unfavorable outcomes, χ^2 : Chi-squad test, *Significant p-value (< 0.05).

DISCUSSION

The reported consanguineous marriage in the current study was about half (49.7%) of the studied couples as they are specific group who were coming to special

Clinic with a reproductive problem. This coinciding with several previous studies that reported high rates of consanguinity in Egypt (43%, 53.8%, 55.4%, and

57.3%) [14,15,16, 10]. However, in studies of Egyptian Family Health Survey (EFHS) [12]; and Hussein et al. [8] the prevalence showed less figures (33.3% and 35.9%, respectively) as they were surveys studies. Most of Arab and Islamic populations were having high rates of consanguinity that ranges from 20–71% of all marriages. [17, 18]

The recorded mean age of the studied couples was 33.7±6.1years for husbands and 28.5±5.7years for wives. The younger age at marriage was linked to consanguineous marriage as higher rate was among consanguineous wives (37.4%) than among non-consanguineous wives (15.4%). The same was found among husbands. This is matched with the known traditions and habits of Egyptian community. Also, Egypt Demographic and Health Survey (EDHS) [19] was reported that almost one quarter of sampled women were married by age 18 years. Furthermore, Sos et al. [20] found that 30% of consanguineous couples married under the age of 18 years. Additionally, Hussein et al. [8] reported that in Egypt consanguinity is associated with younger age of wives at marriage.

Concerning degree of consanguinity, this study revealed that 1st cousin, 2nd cousin and remote degrees of consanguinity were reported among 64.8%, 20.3% and 14.9% respectively. The study of Shawky et al. [21] indicated that 31.4% of consanguineous marriages in Egypt was of 1st cousins. EFHS [12] revealed that 1st and 2nd cousin marriages were 72% of consanguineous marriages.

Current study demonstrated that reproductive wastage and perinatal adverse outcomes were linked to consanguinity; as it revealed significant higher proportions of early and late neonatal deaths (26.2%, 10% respectively), along with infant, child deaths and congenital malformations (19.6%, 14.3% and 61.7%, respectively) among consanguineous couples' group. While couples of non - consanguineous marriage reported the higher percentage of recurrent abortions (52.6%) with statistically significant difference between them and the consanguineous group. These findings are explained by the studies that clarified that consanguineous marriage is associated with higher rates of genetic disorders that outcomes neonatal and infant deaths. [9,5] Recording higher number of abortions among non-consanguineous group may be related to higher level of socioeconomic status among them that support their orientation. These findings agreed with Shawky et al. [21] who recorded, recurrent abortions, stillbirths, and child mortality (67%, 80.6%, 80% respectively) were significantly higher among consanguineous couples ($p \leq 0.05$) in Egypt. Furthermore, 55.4% of Egyptian neonates with congenital malformations (CMs) were born to consanguineous parents than those born to non-consanguineous parents with a significant difference ($p \leq 0.05$) [10]. Moreover, Hussein et al. [22] found that the rate of child mortality was remarkably higher among consanguineous families (16.6%) than non-consanguineous ones (5.7%); with a greater risk of

reproductive loss reported among consanguineous couples.

CONCLUSION

This is one of few studies that recorded the participants as couples. Pregnancy wastage is unfrequently searched and its relation to consanguinity was a chance to be studied in a specialized Clinic. It was concluded that consanguineous marriages, especially first cousin marriages are still widely preferred and prevalent in Egyptian community mainly among women with lower educational levels, lower socioeconomic status, and those who are housewives. Women marriage at age of ≤ 18 years were common among the studied couples and was associated with consanguineous marriage. Reproductive wastages and adverse perinatal outcomes were highly prevalent among consanguineous couples, including congenital malformations. While non-consanguineous couples had a higher rate of recurrent abortions.

Establishment of national awareness program upon consanguineous marriage and its related birth defects, economic and social impacts. Enforced application of premarital and preconception screening for consanguineous 1st cousin marriages and those with positive family history of genetic disorders is strongly recommended for detection of genetic carrier and any potential risk factors. Ethical, religious, and cultural norms should support refusal of early marriage in the Egyptian community with close supervision for legal applications.

A national registration system is highly recommended for detailed medical history of Egyptian citizen and recording reproductive and perinatal wastages with establishment of a community database.

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Conflicts of interest: The authors declare no conflicts of interest regarding the publication of this paper.

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الملخص العربي

تأثير زواج الأقارب على الهدر الإنجابي ونتائج الفترة المحيطة بالولادة

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ملخص البحث

الخلفية: تشير قرابة الدم إلى العلاقة البيولوجية بين الزوج والزوجة. والتي تزيد من احتمالات الهدر الإنجابي والنتائج السلبية في الفترة المحيطة بالولادة والاضطرابات الوراثية.

الهدف: دراسة علاقة زواج الأقارب بالهدر الإنجابي والنتائج السلبية في الفترة المحيطة بالولادة.

الطرق: أجريت هذه الدراسة البحثية في عيادة غير حكومية متخصصة لطب الجنين بالقاهرة، مصر. وقد تم الحصول على البيانات من السجلات الطبية للأزواج الذين حضروا العيادة بأثر رجعي من الفترة 2019 إلى 2023 حيث كان لهؤلاء الأزواج تجربة سابقة في فقدان الحمل وجاءوا لمتابعة الحمل او الاستشارة أيضاً. وتم إدراج جميع السجلات الطبية المكتملة في الدراسة. وقد شملت البيانات الخصائص الاجتماعية والديموغرافية للأزواج، وتاريخ زواج الأقارب، ومدة الزواج، والتاريخ الإنجابي، وتاريخ النتائج الإنجابية السلبية.

النتائج: تم تسجيل تاريخ قرابة الدم بين 49.7% من السجلات المدروسة. وكانت درجة قرابة ابن العم الأول هي الأعلى بينهم (64.8%)، يليها قرابة ابن العم الثاني (20.3%). كما كانت أعلى نسبة للتعليم الجامعي بين مجموعة الأزواج و الزوجات غير الأقارب (57.6%) و (54.6%) على التوالي مقارنة بمجموعة الأقارب (31.1% من الأزواج و 27.2% من الزوجات). كما سجلت أعلى نسبة للهدر الإنجابي بين الأزواج الأقارب (ولادة اجنة ميتة 24%، والتشوه الخلقي 61.7%) وغيرها من النتائج الإنجابية السلبية بما في ذلك حالات وفيات حديثي الولادة في وقت مبكر أو متأخر (26.2% و 10% على التوالي)، ووفيات الرضع (19.6%)، ووفيات الأطفال (14.3%)، مقارنة بنتائج زواج غير الأقارب.

الإستنتاجات: يرتبط الهدر الإنجابي والنتائج السلبية في الفترة المحيطة بالولادة بزواج الأقارب. لذلك، يحتاج الأزواج الذين يعانون من مشكلة الهدر الإنجابي إلى متابعة شاملة أثناء الحمل مع التنقيف الصحي المخصص لهم. كما يوصى بشدة بإنشاء برنامج توعية وطني حول مخاطر زواج الأقارب مع تطبيق الفحص قبل الزواج وقبل الحمل.

الكلمات المفتاحية: زواج الأقارب، هدر انجابي، تشوه خلقي.

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