

# Is It True: Consanguinity Affects Fertility and Increases Negative Outcomes of Pregnancy in Palestine

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## ABSTRACT

**Background:** Consanguinity is a wide spread practice in Palestine. Consanguinity increases the chances of bringing rare recessive allele together leading to various health risks such as increased abortions, stillbirths, cesarean sections and congenital anomalies in offspring

**Objectives:** To determine the health consequences of consanguinity on child and mother, in particular fertility, stillbirths, abortions, cesarean section and infant mortality.

**Methods:** A systematic sampling method was employed to draw the required sample of 500 married women. Arabic questionnaire was used to collect data to answer the research questions. A group of field workers were thoroughly trained on the implementation of this instrument. All 500 women were interviewed by these field workers and completed questionnaires were reviewed before data entry. Data analysis was carried out using SPSS statistical package. Pearson chi square was used to test the association between variables.

**Results:** The study showed that abortion was significantly higher among consanguineous women. All other types of negative pregnancy outcomes in this study including stillbirths, cesarean section, infant mortality and fertility, show higher prevalence among consanguineous married compared to non-consanguineous married women, where there was no significant differences between dependent and independent variables.

**Conclusion:** This study showed that consanguinity has a detrimental effect on many aspects of reproductive health. Therefore, educating the people on the negative health effects of reproduction because of consanguinity is important for preventing or reducing wastage of pregnancy, and related reproductive health problems in Palestine.

## KEY WORDS

consanguinity, fertility, stillbirth, infant mortality, abortion, Palestine

## INTRODUCTION

Consanguineous marriage is a common traditional practice in Middle Eastern societies including Palestine, where intra-familial marriages account for 20-55% of all unions (Hamamy *et al.* 2011). Consanguineous marriage is common in rural areas and among the impoverished and least educated people (Bittles, 1991). It is socially accepted and widely practiced, where first cousins are predominant and their prevalence varies by culture, religion and geography. First cousin marriage has been known to increase the chance of the couples carrying an identical gene derived from one or more common ancestor. The progeny of the first cousin children will therefore be homozygous genotype, allowing the less common alleles to become manifested homozygous, and consequently suffer autosomal recessive genetic disorders. Pregnancy wastage has also been found to be high for women of such marriages (Nath *et al.*, 2004; Bittles and Black, 2010).

Under their enhanced reproductive span, several studies have

reported higher successful pregnancies and surviving children among consanguineous couples, especially of first cousins opposed to nonrelative, where higher numbers of live births were detected (Bittles and Black, 2010).

On one hand, by increasing the frequency of autosomal recessive diseases and a polygenic etiology (Vogel and Motulsky, 1997; Ma'amor *et al.*, 2012; Purmal *et al.*, 2013; Purmal *et al.*, 2013a; Purmal *et al.*, 2013b), the offspring of consanguineous marriages, especially of first cousin experienced many negative health consequences such as low birth weight, high rates of abortions and stillbirths, high neonatal and infant mortality rates, and increased risk of congenital anomalies and certain diseases, as well malformations (Hamamy *et al.*, 2011; Tadmouri *et al.* 2009; Abdulrazzaq *et al.*, 1997; Bener & Hussain, 2006; Mumtaz *et al.*, 2007; Saadat and Mohabbatkar, 2003; Mokhtar & Abdel-Fattah, 2001; Banerjee & Roy, 2002; Verma *et al.*, 1992; Bittles *et al.* 1991; Musa *et al.*, 2013; Dham *et al.*, 2013; Swarhib *et al.*, 2013), in addition to gastrointestinal disorders such as Crohn's Disease (Shafi'i *et al.*, 2012). On the other hand, several of the populations with high rates of

Received on February 20, 2014 and accepted on March 17, 2014

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Table 1. Distribution of parental age at marriage in years and the age at first pregnancy by consanguinity

Variable	consanguinity						P-value
	Yes		NO		Total		
	n	%	n	%	n	%	
Parental age							
< 18	39	7.8	9	1.8	48	9.6	0.001
18-25	221	44.2	115	23.0	336	67.2	
> 25	45	9.0	71	14.2	116	23.2	
Maternal age							
< 18	142	28.4	65	13.0	207	41.4	0.005
18-25	155	31.0	118	23.6	273	54.6	
> 25	8	1.6	12	2.4	20	4.0	
Maternal age at first pregnancy							
< 18	113	22.6	56	11.2	169	33.8	0.061
18-25	176	35.2	121	24.2	297	59.4	
> 25	16	3.2	18	3.6	34	6.8	

first cousin marriages reported positive aspects of such marriages, such as keeping the family fortunes (inheritance) within the same family (Klat, Khudr, 1984), solidity of family ties, ease of marital negotiation and arrangement, believed to be more stable and successful, and reduced dowry expenses (Bittles, 1994; Raz & Atar, 2004; Bener & Alali, 2006; Bittles, 2008; Tadmouri *et al.*, 2009; Sandridge *et al.*, 2010).

Consanguineous marriage increases the chance for the expression of rare, recessive genes which are inherited from common ancestors, leading to deleterious health consequences. For countries such as Palestine, where the consanguineous marriage is a deeply rooted tradition and widely practiced, increased rates of offspring mortality and morbidity can be expected due to inherited deleterious genes (Bittles, 1991). Consequently, determining the prevalence rates of health consequences attributed by consanguinity among targeted population is highly important for public health strategies.

However, despite that consanguineous couples are widely practiced in Palestinian society, little is known about the magnitude of the health effects on the offspring of such marriages. Thus, the purpose of this study was to determine the health consequences of inbreeding on offspring mortality among rural Palestinian community in Yatta, south of Palestine, where the prevalence of consanguineous marriage is high.

METHODS

Sample: All women with a history of pregnancy, delivery and have at least one alive child are eligible to participate in the study. A systematic sampling was employed to draw the required sample. All the participated women were personally interviewed using a structured questionnaire in Yatta to determine the prevalence of consanguineous marriages and the associated health consequences on mother and children. Arabic version questionnaire was used to collect data about the areas of interest: Personal information and socioeconomic factors, family pedigree, the level of consanguinity, if any (that is, first cousin, second cousin, or others), and offspring morbidity and mortality, fertility, reproductive wastage, infant mortality and congenital malformation. This final sample included 500 (61%) consanguineous marriages.

Analysis

Analysis of results was carried out by using SPSS statistical package. Chi square was used to test the association between dependent and independent variables. All variables under study were recorded as reported by the women.

Fieldwork Techniques

Data was collected by female fieldworkers whom were selected at the regional level to ensure familiarity with local norms and locations of sampling areas. The three selected field workers were working with the Palestinian Census Bureau of statistics system; they were given adequate training using role play techniques and small group discussion of the questionnaire.

RESULTS

Consanguineous marriage

The results showed that the prevalence of consanguineous marriages among the participated women was 61.0%. More than one third of the consanguineous marriages were between first cousins (34.8%). Second degree marriages were present in 12.0% while 14.2% of the marriages were among those with third degree relationship (Table 5).

Age at first pregnancy

The result of this study showed that, 169 (33.8%) of the participated women were got their first pregnancy before the age of 18 year, 113 (22.6%) for relative marriages and 56 (11.2%) for non-relative marriages Table 1.

More than one third (176, 35.2%) of the consanguineous married women got their first pregnancy in age between 18 - 25 years, versus more 121 (24.2%) of the unrelated marriages. The results revealed that, overall 34 (6.8%) of women had their first pregnancy after the age of 25 years, 16 (3.2%) for relative marriages and 18 (3.6%) for non-relative marriages Table 1.

Fertility

Fertility was measured by number of pregnancies per woman. This study results indicated that, although the number of pregnancies per woman in consanguineous group was higher than non-consanguineous group, there was no significant difference between the two groups (Table 2).

Delivery

This study results indicated that, although there was a slight difference in the number of deliveries per woman between consanguineous and non-consanguineous groups, where it was higher for consanguineous group, but there was no significant difference between the two groups (Table 2).

Stillbirths

Growing number of studies in public health research reinforced the critical role of socio-economic factors as a determinants of maternal health and stillbirths. However, this study results indicated that almost the prevalence of stillbirths among the women of same geographic and socio-economic background is the same. There was no significant difference in the prevalence of reported stillbirths between the consanguineous and non-consanguineous groups (Table 2).

Abortions

On the contrary to the results of stillbirths - abortions which occurred at or before 28 weeks of gestation was in 18.8% and 5% respectively in consanguineous and non-consanguineous groups. The value was found to be statistically significant (p = 0.037). For example by number of abortions, the results indicate that within the time-group of between 1-2 & more than 2, abortion rates are high among consanguineous marriages (almost 22 per 100 live births, and 13 per 100 live births respectively) than non-consanguineous marriages (almost 15 per 100 live births, and 5 per 100 live births respectively).



**Table 2. Total pregnancies, deliveries, live births, abortions, stillbirths and cesarean sections among mothers by consanguinity**

Number of pregnancies		< 4		4 - 7		> 7		Total		p-value
per woman		P	P/W	P	P/W	P	P/W	P	P/W	
Pregnancy										
Consanguineous		89	17.8	120	24.0	96	19.2	305	61.0	0.785
Non-consanguineous		57	11.4	81	16.2	57	11.4	195	39.0	
Total		146	29.2	176	40.2	210	30.6	500	100.0	
Deliveries		D	D/W	D	D/W	D	D/W	D	D/W	0.762
Consanguineous		75	15.0	150	30.0	80	16.0	305	61.0	
Non-consanguineous		60	12.0	80	16.0	55	11.0	195	39.0	
Total		135	27.0	230	46.0	135	27.0	500	100	
Living children		L	L/D	L	L/D	L	L/D	L	L/D	0.778
Consanguineous		95	19.0	140	28.0	70	14.0	305	61.0	
Non-consanguineous		77	15.4	75	15.0	43	8.6	195	39.0	
Total		172	34.4	215	43.0	113	22.6	500	100.0	

1- P - Number of pregnancies, P/W - Pregnancies per woman.

2- D - Delivery, D/W - Delivery per woman.

3- L - Living children, L/W - Living children per woman.

**Table 4. Infant death by consanguinity in the total sample**

Relationship	No.	%	p-value
Consanguineous	20	4.0	0.521
Non-consanguineous	11	2.2	
Total	31	6.2	

**Table 5. Prevalence of consanguineous marriage among study population**

Degree of consanguinity among consanguineous married women		
Relationship	No.	%
First degree	174	34.8
Second degree	60	12.0
Third degree	71	14.2
Total	305	61.0

**Table 3. Adverse pregnancy outcome by consanguinity in the total sample**

Relationship	Stillbirth			Abortions			Cesarean sections		
	No.	%	p-value	No.	%	p-value	No.	%	p-value
Consanguineous	20	4.0	0.521	174	34.8	0.037	82	16.4	0.223
Non-consanguineous	14	2.8		100	20.0		43	8.6	
Total	34	6.8		274	54.8		125	25.0	

## DISCUSSION AND CONCLUSION

Although the frequency of consanguineous marriages is generally declining, studies in Middle Eastern Arabs confirmed the continuing popularity of this form of marriage, especially in Palestine with a rate of 44.0% in 1994, where more than half first cousin marriages, and 45.3% in 2004, with 27.5% first cousin marriages (PCBS, 2004), as well as in this study the result is 61.0%, with 34.8% first cousin marriages.

This study finding showed significant younger paternal and maternal age at marriage (Table 1). It is a significant feature of consanguineous marriages, because it helps increased levels of fertility by exploitation of maternal reproductive span and makes it in the most fertile years. The effect of this factor on family size is expressed in the higher fertility of inbreeding. The importance of this factor in deciding family size is seen in the higher fertility rates of consanguineous unions. Although the results of this study indicated high fertility among the participated women, but fertility was not affected by consanguinity, where no significant relationship was detected. This result concurs with several previous research findings (Shami, Schmitt, Bittles, 1990; Verma, Prema, Puri, 1992; Jain, Nalini, Chandra, Srinivasan, 1993), but it is in contrast with the results other previous studies in Lebanon (Klat, 1988), and in India (GovindaReddy, 1987), where a significantly higher fertility rate was reported among consanguineous unions. The proportion of early stillbirths was almost the same in the two groups, where no significant differences were reported.

In this study, the results showed that abortions occurred more frequently in women of consanguineous marriages with significant differences. This finding had been supported by several previous studies (Basara *et al.*, 1989; Guz, Dedeoglu, Luleci, 1989; Verma, Prema, Puri, 1992; Nath, Patil, Naik, 2004; Godhi *et al.*, 2009). While other studies was in contrast with our results by reporting no association between consanguinity and repeated abortion (Saha, Hamad, Mohamed, 1990; Al-Awad *et al.*, 1986).

## CONCLUSION

This descriptive cross-sectional household-based study showed that 61% of the marriages in Yatta were consanguineous. Stillbirth, infant mortality, number of deliveries, and cesarean section occurred more frequently in consanguineously married women as reported by study participants. Health consequences of consanguinity showed a significant association between consanguinity and increased abortions. To summarize, the study results demonstrate that there is a relation between consanguinity and adverse pregnancy outcomes in Palestine. All types of negative pregnancy outcomes, which are assessed in this study, show higher prevalence among consanguineous married compared to non-consanguineous married women. This study fills the gaps in documenting the evidence about consanguinity effects on pregnancy wastage and other related reproductive health problems in Yatta, in Palestine. This study revealed the need for health education campaign on the negative health effects of consanguinity.

## ACKNOWLEDGEMENT

The authors of this paper would like to thank the School of Public Health, Al Quds University in Palestine. As well as, the authors would like to thank both the all participants of this study, the field workers, the Municipality of Yatta, and the higher education ethical committee of Al Quds University.

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