

Genetic Analysis, Health Issues and Consanguineous Marriage in Muslim Community

Mohd Younis^{1*}, K. Sasikala², A. Vijaya Anand¹, Javaid Iqbal³, Som Kailash³, Meraj Ud Din Hura³

^{1*}Medical Genetics and Epigenetics Laboratory, Department of Human Genetics and Molecular Biology, Bharathiar University, Coimbatore, Tamil Nadu, India

²Human Genetics Laboratory, Department of Zoology, Bharathiar University, Coimbatore, Tamil Nadu, India

³Department of Zoology, Barkatullah University, Bhopal, Madhya Pradesh, India

ABSTRACT

Consanguineous marriage is the union of individuals have common ancestors. The rate of consanguinity is high among the Muslim community around the world, especially in Arab countries. Many rare genetic disorders and new genetic syndromes, congenital malformations, morbidity, mortality and reproductive wastage have been observed to increase frequency in the consanguineous marriage. Some other abnormalities include low birth weight, cleft lips, congenital heart defect, neurological defect (hypertension, schizophrenia, Alzheimer disease and bipolar disorder), progressive pseudo rheumatoid dysplasia and cancer are observed among the offspring of consanguineous marriages. Progressive rheumatoid dysplasia a rare autosomal recessive disorder is also found among the offspring of consanguineous marriage couples. The frequency of consanguineous marriage is high in uneducated, low educated group and mostly in rural population.

Keywords: Muslim Community, Consanguineous Marriages, Genetic Syndromes, Rare Genetic Disorders.

I. INTRODUCTION

Word consanguineous is derived from two Latin words “con” means common and “sanguine” means blood, therefore referred to marriage between two people with the recent same ancestor. Genetically, the union contracted between biologically associated individual are consanguineous marriage: first cousins, double first cousins, second cousins and first cousins once removed.^{1,2} The marriage between uncle-niece and aunt-nephew is prohibited in Islam, and absent among Arabs. Consanguineous marriage is more common in several Muslim populations, however, the variations in the rules among the religious followers reflect in the occurrence of consanguinity. In western populations, the practice of consanguineous marriages is legal in United Kingdom, Middle East, Africa and Australia, prohibited in China, parts of Europe and United States.³ Consanguineous marriages are allowed within the Islam, Christian and Buddhism. Consanguinity rate in Arab countries has been reported with the highest regularity, 80% in Saudi Arabia, 59% of Iraqis, 49-58% among Jordanians, 40-54% in UAE, 44% among Yemenis in Sana and 40% among

Palestinians.⁴⁻¹¹ In North African Arab countries consanguineous marriages are less common and reported to be 29% in Egypt, but between 41.5-45.5% in Southern Egypt.¹² Due to the presence of genetic isolates and semi-isolated, consanguinity rate is considered high in Kuwait with a low incidence of intermarriage between particular Arab communities.¹³

According to National Family Health Survey 1992-1993, consanguineous marriage rates is 16%, 6% in north and 36% in South, India.¹⁴⁻¹⁶ Similar geographical variations have been observed in other muslim regions and countries include Pakistan and Uzbekistan.¹⁷⁻²¹ An increased frequency of patients with chromosomal abnormalities, multifactorial diseases, autosomal recessive disorders and X-linked diseases was observed in consanguineous marriage.²² It was also reported, the occurrence of mental retardation, epilepsy, asthma and diabetes are much more common among offspring of all consanguineous couples.²³ The highest consanguinity was reported among individuals with low educational level, early first pregnancy, lack of awareness, lack of genetic counselling, child mortality and high infant

death and nutritional disorders, particularly in the rural areas.

II. PREVALENCE OF CONSANGUINEOUS MARRIAGE

Since early age of modern humans, the existence of consanguineous marriages has been practiced. It has been estimated 20% of the population live in communities and 10.4 % of the 6.7 billion population of the world shows the preference for consanguineous marriage.² Globally, it has been reported there is wide variation in consanguinity rate among various communities and there is unevenness between different tribes and ethnic groups within the same country.²⁴ Depend on the religion, tradition, ethnicity and geography the consanguineous marriage rate fluctuate from one to another population. In the world, the highest rate of consanguineous marriage is in Arab countries ranging around 20-50% of all marriages, especially first cousin marriages with average rates of 20-30%. Consanguineous marriage is most common in Middle-Eastern countries and remains common in various communities of the world.²⁵ Among the Arab countries consanguineous marriage has been reported with high incidence, tradition is socially suitable in Saudi Arabia, Iraq, Palestine, Yemen, Egypt, Jordan, Kuwait, UAE, Pakistan, Afghanistan and Uzbekistan.^{25-27,21}

III. SUB-TYPES OF CONSANGUINEOUS MARRIAGES

The intellectual concepts about various subtypes of consanguineous marriages in communities of Muslim also emphasise on certain forms of the relationship such as a). The marriage between children of two brothers. This is the commonest type of cousin marriage and highest being in Yemen. It is the duty of male to marry his cousin and compulsion for the female to accept.²⁸ Zlotogora J et al. reported 20% of marriages between first cousins were found in Palestine. In Pakistan, 60% of marriages are between first and a second cousin was reported.³⁰ b). The marriage between children of two sisters and is the second most common type of consanguineous marriage in Islam. Such marriages are not represent a close family marriage, the sisters is from different family. c). Male is the sibling of brother and female is sibling of sister, such type of consanguineous

marriages are also practiced in Muslim. This sub type of marriages between children of brothers and sisters is satisfactory, significance of tradition in which woman to family of her husband and children not belonging to mother of family. Traditionally marriages between the children of a brother, sister or of two sisters are much considered in Middle Eastern communities and marriages between children of two brothers are most common in Muslim communities.²⁸

IV. CONSANGUINEOUS MARRIAGE IN MUSLIM

Consanguineous marriage is generally common in Muslim communities of the Islamic countries and developing world. Gadgil M et al., conducted study on Muslim populations several studies have been showed consanguineous marriage varies in branches of Islam between and within each country with a wide range of predominance and differences in attitudes towards endogamy. Traditionally, socially and professionally 130 million Muslim population are sub-divided into Sunni, Ismaili, Shia, Dawoodi, Bohra communities and national population over 1,000 million comprises 50,000 to 60,000 endogamous sub-populations.³² Several studies performed in the Middle Eastern countries revealed 52% in Saudi Arabia, 50.5% in United Arab Emirates, 51.52% in Jordan and 56.3% in Sultanate of Oman.³³⁻³⁶ Anthropological report suggested consanguineous marriage throughout Asian countries and sub-Saharan Africa includes Bangladesh, Indonesia, South Sudan and Sudan provide quantitative information.³⁷ Overall prevalence 10.4% among 6.7 billion global populations of related second cousins seems to be declining in some countries.³⁸ The rate of consanguinity highly observed in low socio-economic status, illiterate and rural residential across globe.^{39,40}

V. REASONS FOR CONSANGUINEOUS MARRIAGE

Multiple reasons include religious, ethnic, psychological, tribal customs are major reason at local and national level may encourage consanguineous marriage between and within different countries. Some of them are economic, cultural, sociocultural and other factors too. In Saudi Arabia, Iraq and Jordan high rate of consanguinity may be related to maintenance of family fortunes within family structure the male, female grow

up in similar environment of family and can adjust more easily after wedding.⁴¹⁻⁴³ The most common reasons for popularity of consanguineous marriage include a strong family traditional marriages, maintenance of the family structure, family ties, property, dowry, close relationship between wife and her in-laws, greater marriage stability and durability.^{40,44}

VI. CONSANGUINEOUS MARRIAGE AND COMPLEX DISEASES

The relationships between consanguineous marriage and complex diseases have been significantly under investigation. Limited numbers of study have been published mainly on elementary samples strategies with simply consanguineous versus non-consanguineous marriage comparisons of a complex disease. Consanguineous marriage couples offspring's suffered from common adulthood disorder includes hypertension, schizophrenia, Alzheimer, bipolar disorder, heart disease, osteoporosis, stroke, asthma, gout, peptic ulcer and cancer.^{45,46} Karnib HH *et al.*, suggested the prevalence of kidney disease among offspring shows recessive genetic disease in consanguineous unions and may be recognized via homozygosity mapping. The risks of genetic disorders include progressive pseudo rheumatoid dysplasia, spinal muscular atrophy, mental retardation, sickle cell anaemia, Down syndrome, cystic fibrosis and epilepsy were confirmed to be nearly 20 percent higher in consanguineous marriages.

VII. CONSANGUINEOUS MARRIAGE AND REPRODUCTIVE HEALTH

The fertility rate of consanguineous married couples is lower due to failure in the initiation of pregnancy. During early embryonic expression of deleterious genes and fetal development that result in preconception losses.^{48,49} The quantitative and qualitative study of the society of consanguineous marriage with different parameters of reproductive health in Arab countries is inadequate. Researchers have been failed to point out clearly the different categories of consanguineous marriages in their methodology. There is greater genetic compatibility between the developing fetus and mother in a consanguineous married couple, would lead to reduced rates of unconscious sterility and prenatal losses. The strong possibility of high fertility rate is compensatory

mechanism for infant and childhood losses in consanguineous unions.^{50,51} The risk of congenital heart defect increased among offspring of first cousin marriage in Arabs, Saudi Arabia, Lebanon and Egypt population.⁵²⁻⁵⁴

VIII. NEGATIVE EFFECTS OF CONSANGUINEOUS MARRIAGE ON REPRODUCTIVE HEALTH

Consanguineous marriage and Congenital Malformations

All the newborns from consanguineous couple have 3-5% of the genetic birth defect. In different countries, differences birth defect rates were observed among the consanguineous marriage. It was estimated birth defect to be >69.9/1000 live births in most Arab countries, as opposed to <52.1/1000 live births in Europe, Australia and North America. Lower observed rates of 7.92/1000 births and 12.5/1000 births were registered in Kuwait and UAE respectively.⁵⁵⁻⁵⁷ The risk of birth defect in first-cousin unions was estimated to be 2-2.5 times in general population rate, may be due to an expression of autosomal recessive disorders and the risk of congenital defects increased 1.7-2.8% in offspring.⁵⁸⁻⁶² The frequency of congenital malformations are higher among offspring of consanguineous couples include in the Saudi Arabia, Oman, Iraq, UAE, Kuwait, Egypt, Jordan, Lebanon, Arabs in Jerusalem and Tunisia population.⁶³⁻⁷⁷ Newborn infants of consanguineous parents were diagnosed with a high risk of having congenital heart defects in Saudi Arabia, Lebanon, Arabs in Israel, and Egypt.^{78-80,54}

Consanguineous marriage and deaths in the neonatal, postneonatal and infant periods

Consanguineous marriage is common in the Muslim community are associated with increased level of morbidity and mortality of neonatal, postneonatal and infant.⁸¹ Bittlesa AH *et al.* reported there is a general consensus of neonatal, postnatal, infant morbidity and mortality should be evaluated among the offspring of under 5 years of age. It has been estimated the adverse health consequences of consanguineous marriage variable. Its appeared probably high due to inadequate control of non-genetic variables to influence child health

include maternal education, maternal age and birth intervals.⁸³

IX. NEUTRAL OR POSITIVE EFFECT OF CONSANGUINEOUS MARRIAGE ON REPRODUCTIVE HEALTH

Fertility

Some international reports showed high fertility among the consanguineous couples but generally consanguinity not found significant positive or negative effect on fertility. It was reported high fertility rate and high rate of live births among first cousin marriage couples in Qatar, Kuwait, Saudi Arabia, India and Tunisia.

Fetal Wastage

Multiple studies have been noted highly consanguineous population infant loss has no considerable association with consanguinity in the world. There is no major difference was reported in reproductive loss between the inbred and outbred groups of pregnancies in Sudan.⁸⁴ In Saudi Arabia, it was suggested the prenatal loss was same among the consanguineous and non-consanguineous couples.⁸⁵ Moderate rate of prenatal loss was found among consanguineous marriage couples in some studies.⁸⁶⁻⁸⁸

X. IMPACT OF CONSANGUINEOUS MARRIAGE

Several studies have described the aspects of reproductive behaviour, morbidity, mortality and genetic effect of consanguineous marriage. In consanguineous marriage, the rate of morbidity and mortality frequently increased. The main effect of consanguinity is a high frequency of autosomal recessive diseases in the offspring. The study conducted by Hafez M et al. on high mortality rate, inborn errors and congenital malformations have revealed to occur in first cousin marriage. According to world's major surveys, the prevalence of major defects is slightly higher than 2 to 3% at birth. Many genetic diseases mostly autosomal recessive, X-linked recessive, sickle cell disease and glucose-6-phosphate dehydrogenase deficiency was investigated.⁹⁰⁻⁹² Sickle cell anaemia and glucose-6-phosphate dehydrogenase deficient consanguineous females in Saudi Arabia are significantly higher and this

observation was confirmed by Hardy-Weinberg equilibrium.⁹³

XI. CONSANGUINEOUS MARRIAGE AND AUTOSOMAL RECESSIVE DISORDERS

In consanguineous marriage high prevalence of autosomal recessive diseases, infant mortality and high risk of serious inherited diseases were observed in the offspring. The first cousin marriages lead to the risk of homozygous deleterious alleles increased in the offspring, 12.5% of genes are common among children have overall 6.25% homozygous gene loci. Islam does not allow for first-degree marriage in Muslim. The Qur'an clearly states an individual is banned to marry his mothers, daughters, sisters, father's sisters, mother's sisters, brother's daughters, sister's daughters. Hussain R suggested there is nothing in the Qur'an encouraging relations to third-degree relative marriages cousin marriage. According to the Prophet Mohammad, do not marry to cousins the offspring may be disabled at birth and hadith has also been practised by some Muslims.^{95,96} Consanguineous marriage does increase the probability of mating between two individual heterozygote for the same recessive mutant allele. The risk for birth defects expected to increase sharply particularly for autosomal recessive disease (familial mediterranean fever, progressive pseudo rheumatoid dysplasia of childhood, juvenile sandhoff disease, childhood muscular dystrophy, krabbe disease) results in a high chance of abnormal gene in the offspring of first-cousin marriage.^{97,98}

XII. CONCLUSION

The study found the prevalence of consanguineous marriages is high in Muslim countries. The pregnancy outcome like abortions, stillbirths, congenital anomaly, neonatal, postneonatal and infant deaths was found to be more common and the expression of autosomal recessive diseases, rare syndromes (progressive pseudo rheumatoid dysplasia) in offspring. It is the duty of health professionals to convenience public for health education, genetic counselling, to evaluate the knowledge and awareness of health consequences of offspring of the consanguineous union. Currently, consanguineous couples have fear of health consequences and planning for genetic counselling of their offspring. The advantages as well as the

disadvantages are assessed in consanguineous marriage to advise the consanguineous marriage, where already a child has been born with a genetic disorder or congenital anomaly in the family.

XIII. REFERENCES

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