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PREVALENCE AND RISK FACTORS OF CONSANGUINEOUS MARRIAGE IN SELECTED AREA

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ABSTRACT
India is one of the largest countries in Asia with many subpopulations based on geography, language, religion, and caste. People would not alter their traditional and cultural habits, even after personal modernization. One of the traditional rituals is intrafamilial marriage. Consanguineous marriage, inbreeding, intra family union and endogamy are commonly called as cousin marriage. Consanguinity is a marriage between two people who share their mutual ancestors and are biologically related. In the present study, convenience sample of 500 married women was personally interviewed using a structured questionnaire in Ramanathapuram district to determine the prevalence of consanguineous marriages. Nearly, 279 were found to be a consanguineous pair among the selected population and 221 were found to be a non-consanguineous pair. In the selected population, consanguineous was 1.79 percent of the couple and non-consanguineous were 2.26percent of the couple. The system-wise congenital anomalies with consanguinity are depicted. The frequency of consanguineous is still high, so it seems necessary to design and implement special preventive interventions including multi-level educational programs in order to address the problem.

KEYWORDS: Intra family Marriage, Consanguinity, Prevalence.

INTRODUCTION

Consanguinity, the practice of marriage between individuals who are closely related genetically, has been a subject of medical and genetic interest due to its implications for offspring (Shawky *et al*., 2013). Consanguinity is a marriage between two people who share their mutual ancestors and are biologically related. This is an irreplaceable cultural feature of most communities in the different states of India, with varying percentages of all marriages. It is pointed out that one billion of the existing global population be alive in communities with the first choice for consanguineous marriage (Bittles and Black 2010; Modell and Darr, 2002). Consanguineous marriage has been an unavoidable occurrence since modern humans early life. After Charles Darwin expressed concern that children from a consanguineous marriage may not be viable after seeing three of his children from a cousin's marriage die at a young age, the first technological interest in consanguinity evolved, although their deaths may or may not have been associated with consanguinity. George Darwin's study has recently shown that socioeconomic status has a greater effect on the survival toll of children rather than consanguinity (Bittles, 2009).

Consanguinity is a global phenomenon of varying concentrations in several cultures in different countries. The definition of consanguinity is used to define the union of couples who contribute to at least one mutual ancestor. Inbreeding is a hereditary term refers to a departure exit from nonrandom "mating" in which persons "mate" with individuals more alike (genetically) to them than if they "mated at random" in the population. Consanguineous marriage is traditional and respected in most communities of North Africa, the Middle East and West Asia, a transverse belt that runs from Pakistan and Afghanistan in the east to Morocco in the west and in South India, with intrafamilial unions collectively accounting for 20–50+% of all marriages (Bittles, 2010).

Indian culture is the incorporation of diverse conventions, customs, rituals and a thought corresponding in one central core of seal entity. Spiritual and cultural practices are coupled with Indian family law. The southern relationship representation prevails in the states of Karnataka, Kerala, Tamil Nadu, Telangana and Andhra Pradesh (Rivers, 1907). Attitudes in India on cousin nuptials are based on region and culture. The family law of India focuses on religious and cultural practices. In the states of Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand,

Madhya Pradesh, Odisha, Punjab, Rajasthan, Sikkim, Tripura, Uttar Pradesh, Uttarakhand and West Bengal, the replica of northern affinity prevails. However, matrilateral cross-cousin (mother's brother's daughter) marriages are also found in a few communities in South India. Uncle-niece and first-cousin unions are privileged unions in this region (Arthur, 2005). In the southern states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana, this relationship prevails.

Among the blood ties in the southern states of India, the highest incidence of consanguinity is mainly attributed to caste, religious, and financial status. The economic and community benefits available through consanguineous marriage directly contribute to the maintenance of their core social tradition. Tamil Nadu is one of India's southern provinces, with a total population of Consanguinity in Tamil Nadu is deeply rooted in the cultural trend in all communities irrespective of religion. The Tamil culture is an assimilation of varied conventions, customs, rituals and ideas corresponding to one central core of the sealed entity. Cousin marriages provide outstanding opportunities for the broadcast of cultural principles and social continuity. The National family health survey reported that the consanguinity declines gradually in North India and is highly progress in Karnataka, Tamil Nadu, and Andhra Pradesh (Bittles *et al.*, 1993).

Consanguineous marriage raises the likelihood of discovering recessive conditions, promoting recessive gene expression and causing autosomal recessive disorders by revealing concealed features. Consanguinity has certainly been the subject of much genetic and health research with recurrent links to diseases, disorders and bodily and psychological characteristics, some of which are heavily debated (Bittles, 2012; Bennett *et al.*, 2002 & Bittles and Black, 2010). The offspring of endogamous unions increase the appearance of autosomal recessive gene mutations present at birth from their parents' leads to heritable disorders. The closer biological relationship raises the likelihood of inheritance of one or more unfavourable recessive genes from indistinguishable copies. Autism is a complex medical disorder, and its cause remains unclear despite several diagnoses and advances. Different studies have revealed signs of changes in immune cell activation, cytokine and chemokine imbalance, and elevated blood-brain barrier permeability (Noriega and Savelkoul., 2014). Any changes in cytokine levels might indicate abnormalities in the cellular immune system (Pecorelli *et al*., 2016). The dynamic expression of various cytokines has the potential to alter immune system function. IFN-γ, the sole type II interferon, shares certain functional properties with type I interferons and is mainly produced by T cells and Natural Killer cells during cell-mediated immune responses. IFN-γ is primarily responsible for activating macrophages Bhat *et al*., (2018).

The abnormality is a term reserved for eternal change created during prenatal life by a built-in aberration of growth in a body organization. The exact malformation mechanisms are largely unknown but can include a variety of errors in embryonic cell proliferation, differentiation, movement and programmed death, as well as cell-to-cell contact. Countless consequences in an organization that is undersized, others generate overgrowth; some demonstrate the incompetence of tissue, whereas still others easily alter the profile of an element of the body (Aase, 1992). Among the congenital malformations, 15% of inherited factors like chromosomal malformation and mutant genes, 10% of environmental factors create roughly and 20–25% mixture of hereditary and multifactorial factors are the reasons (Sadler and Montana 2003). Individuals who have abnormal chromosome complements fall into two categories such as those who have the abnormal number of chromosomes and those who have the abnormality of chromosome structure. Numerical abnormalities are also called aneuploidy, characterized by any one of the chromosomes of the pair is absent or numerous copies of the identical chromosome present. Aneuploidy is the majority of non-disjunction or inappropriate division of chromosomes during meiosis. Such types of chromosomal disjunctions are Down syndrome, Turner syndrome, Edwards Syndrome, and Patau syndrome. Most of the trisomies resulted inspontaneous abortion. There may be a dominant quantity of the alleles, meaning the expression of that allele would be overridden on the further allele. Other alleles may be an altered version, known as recessive and their appearance is frequent (Gupta, 2007). The only potential when the alleles from the other blood remarriages have a higher risk of producing offspring with genetic disorders among close blood relatives. Genetic defects may include single gene disorder, multifactorial disorder, chromosomal disorder and aetiological disorder. Autism is characterized by social interaction and communication difficulties and repetitive or stereotypical behaviour (Zhao *et al*., 2021).

This practice, prevalent in some cultures and communities, raises significant concerns regarding the increased risk of genetic disorders in children born from such unions (Benomran *et al*., 2020). The primary medical concern with consanguineous marriages is the heightened risk of genetic disorders. When closely related individuals reproduce, there is a higher probability that both parents carry the same genetic mutation. This situation increases the likelihood of recessive genetic disorders in their children. Recessive disorders, such as cystic fibrosis, thalassemia and Tay-Sachs disease, occur only if a child inherits two copies of the mutant gene, one from each parent (Hamamy, 2012). In consanguineous unions, the chances of both parents carrying the same recessive gene are significantly higher compared to non-consanguineous marriages. As a result, the incidence of autosomal recessive disorders is more frequent in populations where consanguinity is

commonly practiced (Temaj *et al*., 2022). Moreover, consanguinity can lead to an increase in the expression of deleterious genes, leading to a reduction in overall genetic diversity within a family or community. This reduced genetic diversity can have broader implications beyond single-gene disorders (Shanti *et al*., 2015). It may affect complex traits and the overall health of the population, potentially leading to reduced immunity and increased susceptibility to infectious diseases. Additionally, the accumulation of deleterious mutations over generations can result in a higher prevalence of multifactorial diseases, such as, heart disease, nerve affects and diabetes, which are influenced by both genetic and environmental factors. Therefore, the implications of consanguineous marriages extend beyond the immediate risk of single-gene disorders, impacting the broader health and genetic resilience of communities where it is practiced. Hence, the current research aimed to estimate the prevalence and patterns of endogamy, different types of congenital abnormalities in the selected Ramanathapuram population in particularly Sakkarakottai Village.

METHODOLOGY

CONSANGUINITY MARRIAGE

A convenience sample of 500 married women was personally interviewed using a structured questionnaire in Ramanathapuram district Sakkarakottai village to determine the prevalence of consanguineous marriages. This study used the marriage history and pregnancy related information of currently married women in the age group above 25 years during the two years preceding the date of survey. Women in the ages of above 25 are asked specific questions about marriage history and practices such as consanguineous marriage. The fieldwork to quantitatively estimate the occurrence of consanguinity with lack of rigidity was conducted between December 2023 and February 2024. Through personal visits to the selected families, information on endogamy was collected. For the investigation, the families who were willing to share the family background details, marriage details and pregnancy outcome were taken. To all the volunteers, the interpretation of the research was clearly explained. We have used a random sampling method in this investigation to evaluate the levels, patterns and degrees of consanguineous marriages. The females were asked for detailed information on their marriage practises, such as, collateral marriage relations, as part of the survey. The specific questions asked in this survey are “Are you related to your husband by blood? If so, what is the relationship?” (Options given for this question are no relation, Uncle, Cousin, Others). Similarly, questions are asked to women concerning the history of pregnancy outcomes such as stillbirth, miscarriage, spontaneous abortion and induced abortion, etc.

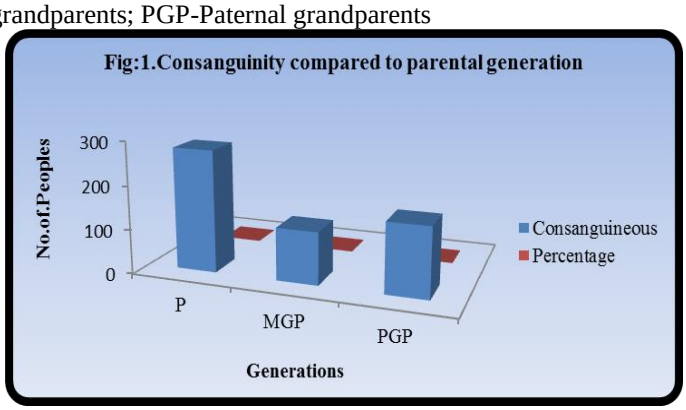
RESULT

In the present study, we have taken 500 peoples. Nearly, 279 were found to be a consanguineous pair among the selected population. In the selected population, consanguineous was 1.79 percent of the couple. The consanguineous maternal grandparents' population were 120 and paternal grandparents' population were 59. Consanguinity percentages maternal grandparents' population were 2.32 percent and paternal grandparent’s generation were 1.75 percent. Statistically, the difference was significant (P<00001). The Consanguinity in current generation compared to parental generation depicted in Table-1 & Figure-1.

Table 1: Consanguinity in current generation compared to parental generation.

	Consanguineous	Percentage of Consanguinity
P	279	1.79%
MGP	120	2.32%
PGP	159	1.75%

P-Parents; MGP-Maternal grandparents; PGP-Paternal grandparents



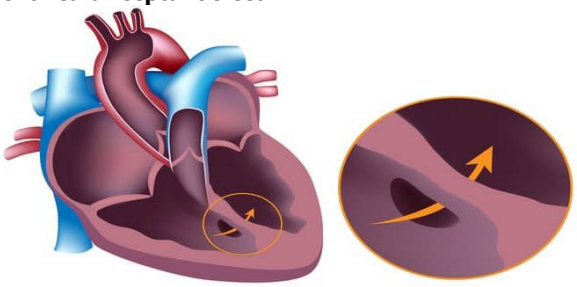
Since hereditary information has been passed down to offspring from parents, grandparents, and great grandparents, people who have been linked to blood will contribute to a higher percentage of the same genes than isolated individuals. Based on the percentage of their genes they contributed as degrees, genetic experts have divided how close relationships are considered.

The total number of deliveries during the study from June 2023 to January 2024 was 400. The total number of neonates with congenital anomalies identified was 175 of the neonates born with defects, 120 were consanguineous union products and 55 were non-consanguineous union products.

In the present study, the number of congenital heart defect cases 45 (29 consanguineous and 16 non-consanguineous) were identified. The ventricular septal disorder was 20; atrial septal disorder 13, pulmonary stenosis 11, and dextrsocardia-1 among these heart impairments.

Ventricular septal disorder: It is a common heart defect present at birth. The defect occurs in the septum which separates the ventricles of the heart and enables blood to pass from the left side to the right side. The oxygenated blood is then pumped back to the lungs rather than out into the body, allowing the heart to work harder.

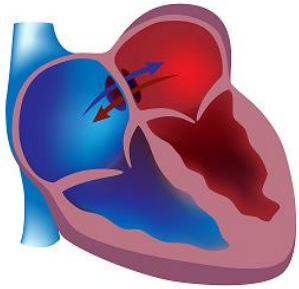
Ventricular septal defect



Source: https://www.medlife.com/blog/ventricular-septal-defect.

Atrial septal disorder: Atrial septal disorder is a hole between the two upper chambers of the heart. This is inborn disorder. Due this defect, enormous amount of blood passes into the lungs. The heart and lungs can be damaged gradually during the course of time.

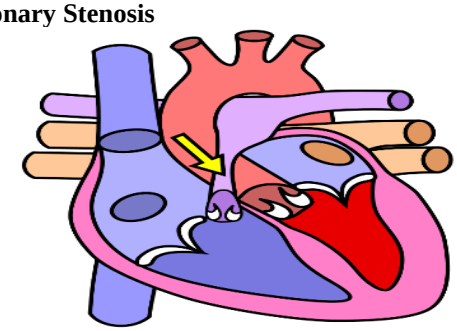
Atrial septal defect



Source: https://www.registerednursern.com/atrial-septal-defect-nclex-questions/

Pulmonary stenosis: The pulmonary valve is narrowed and cannot open systematically. This makes harden the right ventricle and improper pumping of blood in to the lungs. This can trigger thickening of the right ventricle in due course.

Pulmonary Stenosis



Source: https://www.marvistavet.com/pulmonic-stenosis.pml

Dextrocardiac: Locationof heart on the right side of the chest.

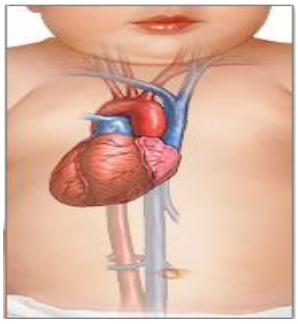


Plate 7: Dextrocardiac.

Source: https://medlineplus.gov/ency/article/007326.htm

Among the total neonates studied 36 people with the musculoskeletal disorder (24 consanguineous and 12 non-consanguineous). Among this Polydactyly were 12, osteogenesis imperfect 6, clubfoot 4, achondroplasia 4, amelia 3, syndactyly 2 and arthrogryposis 1 were among these musculoskeletal disorders.

DISCUSSION

Tamil Nadu has diverse cultures and traditional practices with a heterogeneous population. In India, most of the studies on consanguinity concentrate primarily on the southern states. Results show that in Tamil Nadu (38 percent) the incidence of consanguineous unions was higher, followed by Andhra Pradesh (30 percent). Consanguinity is one of the cultural-anthropological practices. While social being and individuality customarily centre of focus on the family, family relations extend into the configuration of clans and tribes. For this reason, an individual's knowledge of trustworthiness is oriented to the full matrilineal, patrilineal kinship. Inborn malformations are nothing but a structural defect at birth, according to the World Health Organisation (Tanteles and Suri 2007).Studies over many decades have shown that the association between consanguineous marriage and hereditary congenital malformation is strong (Bener*et al.*, 2007). In the present study, also proved association between consanguineous marriage and hereditary congenital malformation is strong.

Consanguinity is a longstanding tradition in Muslim communities however this kind of marriage occurs in every religion and is not attributable to a certain religious rule (Akrami *et al* 2009, Alvarez *et al* 2011, and Masood *et al* 2011). Based on marriage regulations in Islam, first cousin and double-first cousin marriages are permitted and Unions between first degree relatives and uncle-niece are prohibited. Present study, also accepted this statement. Economic benefits ascribed to consanguineous marriage are lower cost and more simplicity or ease of premarital negotiations and marital arrangements, lower expectations of parents and partners, and financial advantages regarding dowry (Akrami et al 2009, Shawky *et al* 2011, Hamamy *et al* 2011, Aboualsoltani*et al* 2009, Masood *et al* 2011, and Tadmouri *et al* 2011). But it is a fact that nostudies have investigated the rate of divorce in consanguineous marriages. The frequency of consanguineous marriage in this present study 1.79 percentage. In our country children live with their parents until theymarry and commence a separate life, therefore the parents' characteristics influence the marriage pattern of their offsprings.

Recent studies showed that there is significantly higher rate of consanguinity of parents of epilepsy patients. There is also significantly higher rate of epilepsy among family members with consanguineous marriage for both cryptogenic and idiopathic epilepsies (Mehndiratta, 2007).

Similar to other studies, in our study the most common form of consanguineous marriage was between first cousins, (Akrami *et al* 2009, Tayebi *et al* 2010, Aboualsoltani *et al* 2009, Sedehi *et al* 2012). The frequency of marriage between double-first cousins in this study was 1.2%, which is lower than a study in Egypt (4). These kinds of marriages need special attention because of their high coefficient of inbreeding (F=0.125), which means that their progeny will be homozygous at 12.5% of all loci and at higher risk for autosomal recessive disorders (5). Present studies also have identified various congenital abnormalities such as, Down syndrome, leg paralysis, visual impairment, vitiligo etc.

Our analysis indicated that the majority of participant shad themselves chosen to marry consanguineously. Thisfinding along with the low awareness of couples in this study about the effects of consanguineous mating onchildren's health, reflect the need for appropriate educational programs in our community.

This study has several implications for public health in preventing the problem. Our results showed the very shortage of community's knowledge about consanguineous marriage and the strong need for designing and implementing appropriate individual, family, community, and school-based educational programs. Additionally it seems reasonable to integrate these educations whitones for early marriage and to start these programs at a younger age, as there is consistent evidence for the interaction between consanguinity and the age of marriage.

CONCLUSION

In summary our study challenged the prevalence and determinants of consanguineous marriage in an urban area. The frequency of consanguineous mating is still high and needs special preventive interventions, especially in rural areas. It is necessary to implement multi-level educational programs due to the lack of knowledge in our community and its positive association with the occurrence of consanguineous marriage demonstrated in this study.

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