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An overview on concept of *Tulya Gotra* and Consanguinity

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ABSTRACT

Chromosome is always preserved throughout a male lineage because a Son always gets it from his father, while the X Chromosome is not preserved in the female lineage because it comes from both father and mother. Consanguineous means related by blood. It has been estimated that the average person inherits several alleles for conditions lethal prenatally, plus between one and two for other harmful recessive disorders. This hidden detrimental component of the genome is called the genetic load. The main genetic consequence of inbreeding is to bring such recessive alleles to expression by increasing the proportion of homozygotes. Procurement of a healthy offspring begins with the selection of partner. For this it has been mentioned that the partner who will indulge in coitus for achieving a child should be of "*Atulya Gotra*." For procreation of a healthy child it is necessary that the male & female should be mutually of a different clan. Coitus among the member of the same clan is a sinful act which does not have the sanction of scriptures. If they are from *Tulya* or same *Gotra* then it is a sinful act according to the *Dharma Shastra*.

Key words: *Tulya Gotra, Consanguinity, Genetics, Congenital disorders.*

INTRODUCTION

Humans have 23 pairs of chromosomes and in each pair one chromosome comes from the father and the other comes from the mother. So in all we have 46 chromosomes in every cell, of which 23 come from the mother and 23 from the father. Of these 23 pairs, there is one pair called the Sex chromosomes which decide the gender of the person. During conception, if the resultant cell has XX sex chromosomes then the child will be a girl and if it is XY then the child will be a boy. When the initial embryonic cell has XY chromosome, the female attributes get suppressed by the genes in the Y chromosome and the embryo develops into a male child. Since only men have Y Chromosomes, son always gets his Y chromosome from his father and the X chromosome from his mother. On the other hand daughters always get their X chromosomes, one each from both father and mother. So the Y chromosome is always preserved throughout a male lineage (Father - Son - Grandson etc.) because a son always gets it from his father, while the X Chromosome is not preserved in the female lineage (Mother, Daughter, Grand Daughter etc.) because it comes from both father and mother. A mother will pass either her mother's X chromosome to her children or her father's X chromosome to her children or a combination of both because of both her X chromosomes getting mixed (called as Crossover). On the other hand, a son always gets his father's Y chromosome and that too almost intact without any changes because there is no other corresponding Y chromosome in his cells to do any mixing as his combination is XY, while that of females is XX which

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hence allows for mixing as both are X Chromosomes. Scientist Gregor mendal find out the concept of genetic in 19th century. He told about the concept Trait inheritance i.e. how the different characteristics passed on from one generation to the next. After Gregor mendal researches are going on continuously on this concept. Recently a newer concept emerges in the form of epigenetics. Epigenetics is the changes in phenotype without change in genotype. These phenotypic changes influenced by different factors like environment, diseased condition etc. Ayurveda being an oldest science covers all the concepts whether its genetics or epigenetics.

DISCUSSION

Concept of *Gotra*

The word "*Gotra"* is formed from the two Sanskrit words "*Go*" (meaning Cow) and '*trhi'* (meaning Shed). So *Gotra* means Cowshed, where in the context is that *Gotra* is like the Cowshed protecting a particular lineage.[1] Ayurveda emphasizes on prevention of diseases. The first step towards this prevention is from birth itself. Achievement of a healthy progeny is the main aim of couple.[2]

Procurement of a healthy offspring begins with the selection of partner. For this *Acharya Charaka* has mentioned that the partner who will indulge in coitus for achieving a child should be of "*Atulya Gotra*." For procreation of a healthy child it is necessary that the male and female should be mutually of a different clan. Coitus among the member of the same clan is a sinful act which does not have the sanction of scriptures. *Chakrapani* comments a male and a female from *Atulya Gotra* should be married to each other. If they are from *Tulya* or same *Gotra* then it is a sinful act according to the *Dharma Shastra*.[3]

Gangadhara comments describing that a *Shaddhatuka Purusha* who take birth in a Human womb should follow the principles of *Atulya Gotra* which is mandatory. He defines *Atulya Gotra* which means the the male and female before copulation should be of two different clan. He adds *Panini* quoting that the *Apatya Marga* to procure the progeny should be of two different clans. Not only of different clan but before uniting the female should have completed the three nights of menstruation. The copulation can be performed from 4th day to 16th day of the cycle in a lonely place. *Garbha* can only be formed if all the elements from both the male and female are in proper condition. While explaining about *Gotra* he himself raises a question whether the concept of *Atulya Gotra* spoken here is applied for *Parajayaya* or the female other than his own wife or *Swajayaya*. Further, he answers the query saying that here the concept of *Atulya Gotra* is only spoken for *Dharmya Vishayas* or the one which is followed according to the *Dharma Shastra* or the righteous acts which means the *Atulya Gotra* is applicable to those who follow *Vaidika Karmas* or the rituals. So according to *Dharma Shastra* the male who marries a female and cohabits only with his single wife is considered to be *Vaidaka* or following the rules of religion. So before the marriage, the male and female should be of different clan rather after marriage they cannot be called as *Atulya gotriyas* as they belong to same clan. *Gangadhara* continues the commentary referring to *Manus* saying *"Asapinda Cha Ya Mathurasagotra Cha Ya Pithuh Saa Prashasthidvijaateenam Dharakarmani Maithune" - Manusmruthi.*

Manu Dharma shastra quotes not only *Atulya Gotra* but also *Asapinda* which means from different *Pinda* (kinsman connected with ancestors) to have a progeny and such pairs only are eligible to get married (*Darakarma*), The *Atulya Gotra* here is not only considered before marriage for the couples who get married, but *Gangadhara* adds saying that the male and female who are yet to marry also should be the progeny of different clans that is the parents of a girl and boy should also be of different clan before marriage. So, even the progeny of *Sagotra* marriages were denied for marriage which was considered *Adharma*.[4] But the *Sapinda* - relationship ceases with the seventh person in the ascending and descending lines, the *Samanodaka* - relationship when the common origin and the existence of a common family name are no longer known.

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Sushrutha in *Shareera Sthana* quotes the formation of *Garbha* or womb and its qualities of development of each and every part of the body depends upon the *Swabhava* or the inherited characters from *Shukra* and *Shonitha* and also the *Dharma* and *Adharma* followed.[5] He also adds saying that the *Dosha* or the exaggerating factors which are in its peak whilst the time of cohabitation of *Shukra* and *Shonitha* (a sperm and ovum), the same would be the characters of the progeny. If any component of the sperm or the ovum is with some defects then according to that the diseases would also arise. The natural process of development of organs is not considered to be defection in the womb but the defective alteration which happens due to *Beeja* (sperm and ovum) and *Beejavayava* (component) is invisible in *Garbha*. Therefore *Atulya Gotra* also might have its effects on the quality of *Beeja* which can produce a healthy progeny.[5]

Vagbhata in *Ashtanga Hridaya* defines the rule of marriage saying whatever the factors which is going to destruct the progeny should be avoided. The *Gotra* which should be of admirable features which should be according to the *Kula* and *Desha*. *Kula* here may be occupation which is followed from generation and *Desha* is the rules and rituals followed according to the geographical area.[6]

Astanga Sangrahakara while describing the qualities of the girl eligible for marriage also adds the importance of *Kanya* from *Atulya Gotra* to be selected, which can prevent the *Kula Sanchari Roga* or the diseases which are prevalent in the family. The *Kula Sanchari Rogas* are said to be *Kushta*, *Paingulya* etc. according to *Indu* the commentator.[7]

Theories on formation of *Gotra*

Different schools of thought exists like

- The custom of exogamy arose owing to the paucity of women in early times.
- To prevent the early sexual promiscuity within the clan.
- Due to the absence of sexual attraction between persons who are brought up together.
- The patriarch of the family himself wanted to keep the young girls of the family for himself.
- The clan blood was regarded sacred and to spare the divinity of the totem one had to refrain from its appropriation for sexual purpose.
- To increase the number of followers of a particular *Gotra*.

These theories do not seem to be conclusive in them. To take the first theory even if granted that the female population was less than the male one, in ancient times, the paucity of women would not stand in the way of every young man for taking his wife from within his own clan.

As regards the second theory, we are quite familiar with the fact that the savages are not credited with such a thoughtful scheme of improving morality of the clan. The third theory does not take the facts in order; the absence of sexual attraction is a result rather than the cause of prohibition; for example, animals do not betray such repulsion, and in many religious orgies of India, even at present, no scruples are felt in sexual intercourse within the same clan. The fourth theory of patriarchal is borrowed from the beast-herds, where the strongest animal drives the younger ones away from the females. But will not the patriarch appropriate the new corners also the origin of exogamy must be sought for somewhere else. The theory of totemic sanctity also is not supported by facts. It is not probable that the totem was regarded as divine in the period when the custom of exogamy arose. Moreover, the members of the clan were regarded as friends and equal and not as gods. In this case the clan blood was not too sacred for sexual intercourse.[8]

1. Concept of *Atulyagotriya Vivaha* (non-consanguineous marriages)

According to *Acharya Charaka* marriage are permitted between the male and female who are of separate *Kula* or *Gotra*. Chakrpani commented that same *Gotra* marriages are considered as *Adharma* and it is prohibited in *Dharma Shastra*. Due to inheritance parents and children, brothers and sisters, commonly

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share 50% of their genetic make-up. Similarly uncle and niece share 25% and first cousins 12.5% of their inherited genetic material as it originates from a common ancestor. In such situations if there are any silent genetic defects, then such errors may manifests as a disease in the child of a consanguineous parents.[9]

2. Preconceptional care

For the procreation of progeny having excellent qualities, man should have unaffected *Shukra* (semen) and the woman should have unimpaired *Shonita* (ovum) and uterus. Man should be administered with *Ghrita* and *Dugdha* (milk) simmered with sweet taste medicine. The woman should be given *Tila* oil and *Masa* to eat. Drugs with sweet taste promote the quality of *Shukra* and *Taila* and *Masa* are good for *Shonita* due to their *Agneya* property.[10] Concept of preconceptional care is also there in modern medical science, which was given by our *Acharyas* so many years ago. A new WHO report shows that preconception care has a positive impact on maternal and child health outcomes. Its ultimate aim is to improve maternal and child health, in both the short and long term. Opportunities to prevent and control diseases occur at multiple stages of life; strong public health programs that use a life-course perspective from infancy through childhood and adolescence to adulthood are needed. Preconception care contributes to these efforts.[11]

3. Concept of *Beeja Beejabhaga Beejbhaga Avayava Dushti*

This concept of *Acharya Charaka* clearly gives the idea about the genetic perception in Ayurveda. If a woman is conceived when her ovum and uterus were not completely vitiated but simply affected by the aggravated *Dosas* because of her indulgence in *Dosa* aggravating regimens, single or various other organs of foetus derived from the maternal source (ovum), viz. skin, blood etc., get deformed. These vitiated *Dosas* may afflict the *Beeja* (fertile part i.e. sperm and ova) or the *Beejabhaga*, (a part of the *Beeja*-the nearest term in the parlance of modern genetics is chromosome) by which the corresponding organs derived from these *Beejas* and *Beejabhagas* get deformed. When the *Beejabhaga* (part of the *Beeja*) which is the cause for the formation of uterus is excessively vitiated, then female delivers a sterile child. When the *Beejabhagavayava* (a portion of the part of the *Beeja* that may be considered as gene) in the ovum of the mother got vitiated, then mother produces a *Putipraja* offspring. When the *Beejabhagavayava* is responsible for the production of the uterus and also the portions of the *Beejabhagas* which are causative factors for the formation of various body parts or organs that characterize a female, viz. breasts, genital organ, hair etc., in the ovum (*Beeja*) of the female gets extremely vitiated then she delivers a child, not a complete female child but only having the woman like features in abundance - such a type of child is known as *Varta*. These all sicknesses occurs due to abnormalities of the female's genes. Similar concept is also for the male. Deformities occurs due to blemishes in male gamete in the form of *Vandhyam*, *Putipraja* and *Trinaputrika*.

Causes like *Beeja, Beejabhaga* and *Beeja Bhagaavayava* impact the manifestation of inherited disorders which distresses the forthcoming generations. Diseases like *Prameha* (congenital diabetes), *Sahaja Arsha* (congenital hemorrhoids) and *Kushta* (congenital leprosy) are given which occurs due to vitiation of *Beeja.*[12]

4. *Bala Vridhikara Bhava*

Out of thirteen types of *Bala Vridhikara Bhava Balavatpurushe Deshe Janma* is one of them. *Balavat Purushe* means naturally healthy parents and *Balavat Deshe* means a place with healthy environment. It is the concept which is basically related to genetics. People who are naturally strong having good genetic trait will pass their characteristics through genes to the next generation.[13]

5. *Prakriti*

Genotype and phenotypic characteristics of an individual is known as *Prakriti*. It is formed at the time of fertilization due to involvement of *Dosha*. Six types of *Prakriti* discussed by *Acharya Charaka* in *Indriya*

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Sthana and *Kulaprsakata* is one of them. It means traits passes from generation to generation. There is a correlation between *Prakriti* and gene related symptoms. Y Ghodke, K Joshi and Partwardhan et al. describe *Prakriti* on the basis of CYP2C19 gene polymorphisms on the basis of metabolic activity. Partwardhan et al. shows relation between *Prakriti* and HLA DRB1 allele frequencies.[14]

Other References

Acharya Sushruta classified disease into seven types and *Adibalapravrita* is one of them. Further, *Adibala Pravrita* diseases are those produced by the abnormalities "of *Shukra* (semen vis-a-vis sperm) and *Shonita* (menstrual blood a vis-a-vis ovum) such as leprosy, piles etc. These are again of two types viz. *Matrja* - derived from the mother and *Pitrja* - derived from the father.

Yonivyapada

Twenty types of gynecological disorders are described by *Acharya Charaka*. There are four basic causes for all type of *Yoniyapada* i.e. wrong regimen, menstrual morbidities, defective genes and *Daivakarma* (result of the evil actions of the past life). The genetic morbidity described here specifically refers to that of the mother i.e. her ovum.

Klaibya

According to cause different types of *Klaibya* are given in the classical texts. Four types of *Klaibya* are explained by *Acharya Charaka*, whereas six types are given by *Acharya* Sushruta. Out of them *Beejopaghaataja* and *Sahaja Klaibya* occur due to *Beeja Dushti* which can be correlated with genetic deformity.

Sexual abnormalities: There are the eight types of sexual abnormalities described by *Acharya Charaka.* Out of them followings occurs due to defect in *Beeja* of either mother or father.

Dvireta

Various parts of the human body are represented in the sperm or ovum. If that fraction of the sperm and ovum which is liable for the creation of the germinal cells in the foetus is affected and if these sperm and ovum are equally divided during the process of conception, then the offspring will be hermaphrodite. Such progenies will have the characteristic features of both the sexes.

Kliba

The congenital lack of strength and passion results in the weakening or inefficiency of sperm and ovum which leads to male and female sterility respectively.

Vakri

During coitus uneven position of the female produces the hypospadiac offspring.

Other than these *Sushruta* has described *Asekya*, *Saugandhika* and *Kumbhika* as sexual abnormalities where *Beej Dushti* considered as contributing factor.

Concept of Consanguinity

Consanguinity (Latin con = shared, sanguis = blood) means descends from a common ancestor. A consanguineous couple is usually defines as being related as second cousins or closer. It is also defined as the marriage between close relatives. The harmful effect associated with consanguinity is the expression of the rare abnormal recessive traits inherited from common ancestors'.

Consanguineous means related by blood: As a working definition, unions contracted between persons biologically related as second cousins or closer are categorized as consanguineous, having one or more ancestors in common no more remote than a great-grandparents.

Global Prevalence of consanguinity

- **Less than 1%:** United Sates, Russia, Australia, parts of Latin America and Europe.
- **1-10%:** China, Latin America, North India, Japan, South Europe and Canada.
- **10-50+%:** Arab countries, Turkey, Iran, Pakistan, Afghanistan, South India.
- **Unknown:** Parts of South-East Asia, most Africa.

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Genetic classification of relationship

Relationships between blood relatives have been classified by genetics specialist according to degree of closeness, based on the perportion of their genes that they share:

1. Brothers and sisters, nonidentical (dizygotic or faternal) twins, parents and children are ***first degree relatives***; they have half of their genes in common.
2. Uncle and aunts, nephews and nieces, grandparents and half brother and half sisters are ***second degree relatives***, they have a quarter of their genes in common.
3. First cousins, half uncles and aunts, half nephews and nieces are ***third degree relatives***. They have an eight of their genes in common.
4. Second cousins, great grandparents, great uncle, great nephews and nieces are ***fourth degree relatives***.

Consanguinity and Birth defects

- Generally speaking, frequency of congenital malformations among newborns of first cousin unions is about 2 times the frequency among the general population. In other words instead of a rate of 2-3% of birth defects in the general population, the risk to first cousin couples is around 4-6%.
- Another estimate puts the offspring of first cousin unions at a 1.7-2.8% increased risk above the population background risk.[15]

Consanguinity and genetic disorders

Among genetic disorders, only Autosomal recessive disorders are strongly associated with consanguinity, approximately 30% of sporadic undiagnosed cases of mental retardation, congenital anomalies and dysmorphism may have an Autosomal recessive etiology with risks of recurrence in future pregnancies.[16]

Consanguinity Atopy

Atopy is naturally occurring familial hypersensitivity or allergic reaction of human beings for which there was a genetic predisposition. The basis for the predisposition lies in the histocompatablity genes. Hey fever and asthma are two of the most commonly inherited allergies. Contact dermatitis and gastrointestinal reactions also may be inherited. As with all type 1 hypersensitivity reactions, IgE is the primary antibody involve. Here antigens involved are inhalants like pollen, house dust or ingestants like eggs and milk. Predisposition to Atopy is genetically determine. All individuals produce IgE response is precondrant. Symptoms of Atopy are caused by the release of pharmacologically active substances following the combination of the antigen and cell fixed IgE. The portal of entry of the antigen is usually determines clinical expressions of atopic reactions, example conjunctivitis, rhinitis, gastrointestinal symptoms, dermatitis etc. sometimes the effects may be at sites remote from the portal of entry, e.g.- urticaria following ingestion of the allergens.[17]

Consanguinity and intelligence

Severe mental retardation is associated with consanguinity because many Autosomal recessive conditions include moderate-severe MR. Association of consanguinity with low intelligence is not confirmed.[18]

Exogamy

Exogamy is a social arrangement where marriage is allowed only outside of a social group. The social groups define the scope and extent of exogamy, and the rules and enforcement mechanisms that ensure its continuity. In social studies, exogamy is viewed as a combination of two related aspects: biological and cultural. Biological exogamy is marriage of non blood-related beings, regulated by forms of incest law. Cultural exogamy is the marrying outside of a specific cultural group. The opposite of exogamy is endogamy, a marriage within a social group.

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Cultural exogamy

Cultural exogamy is the custom of marrying outside a specified group of people to which a person belongs. In addition to blood relatives, marriage to members of a specific totem, clans or other groups may be forbidden. Different theories are proposed to account for the origin of exogamy. Edvard Westermarck said an aversion to marriage between blood relatives or near kinemerged with a parental deterrence of incest. From a genetic point of view, aversion to breeding with close relatives results in fewer congenital diseases, because, where one gene is faulty, there is a greater chance that the other being from a different line is of another functional type and can take over. Out breeding thus favours the condition of heterozygosity, that is having two non-identical copies of a given gene. J. F. McLennan holds that exogamy was due originally to scarcity of women, which obliged men to seek wives from other groups, including marriage by capture, and this in time grew into a custom. Émile Durkheim derives exogamy from totemism and says it arose from a religious respect for the blood of a totemic clan, for the clan totem is a god and is especially in the blood. Claude Lévi-Strauss introduced the "Alliance Theory" of exogamy, that is, that small groups must force their members to marry outside so as to build alliances with other groups. According to this theory, groups that engaged in exogamy would flourish, while those that did not would all die, either literally or because they lacked ties for cultural and economic exchange, leaving them at a disadvantage. The exchange of men or women therefore served as a uniting force between groups.

Dual exogamy

Dual exogamy is a traditional form of arranging marriages in numerous modern societies and in many societies described in classical literature. It can be matrilineal or patrilineal. It is practiced by some Australian tribes, historically widespread in the Turkic societies, Taï societies (Ivory Coast), Eskimo, among Finnic people and others. In tribal societies, the dual exogamy union lasted for many generations, ultimately uniting the groups initially unrelated by blood or language into a single tribe or nation.

Linguistic exogamy

Linguistic exogamy is a form of cultural exogamy in which marriage occurs only between speakers of different languages. The custom is common among indigenous groups in the northwest Amazon, such as the Tucano tribes. It is used to describe families in Atlantic Canada with a Francophone and an Anglophone parent.[19]

Consanguineous marriage trends in India

Attitudes in India on cousin marriage vary sharply by region and culture. The family law in India takes into account the religious and cultural practices and they are all equally recognized. For Muslims, governed by uncodified personal law, it is acceptable and legal to marry a first cousin. But for Hindus it may be illegal under the 1955 Hindu Marriage Act, though the specific situation is more complex. The Hindu Marriage Act makes cousin marriage illegal for Hindus with the exception of marriages permitted by regional custom. Practices of the small Christian minority are also location dependent: their cousin marriage rates are higher in southern states like Karnataka with high overall rates. Cousin marriage is proscribed and seen as incest for Hindus in north India. In fact it may even be unacceptable to marry within one's village or for two siblings to marry partners from the same village. The northern kinship model prevails in the states of Rajasthan, Gujarat, Uttar Pradesh, Odisha, West Bengal, Bihar, Jharkhand, Madhya Pradesh, Uttarakhand, Haryana, and Punjab. However in south India it is common for Hindu cross cousins to marry, with matrilateral cross-cousin (mother's brother's-daughter) marriages being especially favoured. The southern kinship model prevails in the states of Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu.[20]

CONCLUSION

Consanguineous marriages are common in our country, but approximately 30 to 40% of the people in India are not very well aware regarding that the

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children of consanguineous couples are more diseased in compare to non-consanguineous couple children's i.e. genetic disorder or congenital anomalies. But 60-70% of the Indian people, though they knows about the bad effects of consanguineous marriages, they are not paying much attention and still following this culture, and this heritage is more common in south Indian population of Hindus as well as Muslims. We can conclude that there is a clear direct relation between consanguineous marriages (*Tulyagotriya Vivaha*) and congenital/genetic disorders (*Janmajata Vikara*) in their respective offspring's. Review study clearly concludes that closer the degree of consanguinity; chances are more of getting congenital anomalies or genetic disorders (*Janmajata Vikara*) in the offspring.

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