

Decadal Distribution of Inbreeding Among Thoti - A Small Primitive Mendelian Population

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ABSTRACT The Thoti is a small primitive tribal population practising high percentage (77.64 %) of consanguineous marriages. The decadal analysis also shows the high percentage of consanguinity prevalent in this population during the past four decades. The coefficient of inbreeding for autosomal and sex-linked gene was found to be 0.0356 and 0.0340, respectively. When compared with other tribal population of Andhra Pradesh, higher percentage of consanguinity is found among Thoti population.

INTRODUCTION

The breeding structure of the human population assumes importance since it reflects the functional aspects of social structure and influences the gene pool. The practice of consanguinity is very ancient in India and is mentioned even in Mahabharata. Quantitative data on consanguineous marriages in India was first presented by Sanghvi in 1956 and, thereafter several workers attempted to present the data on inbreeding from different parts of the country. Pride, power, prestige, geographical distribution, property as well as the interpersonal relationship between the new bride and her mother-in-law and religious sanctions are the major factors responsible for the practice of such type of marriages. Except Muslims and a few other communities the practice of consanguinity is found to be absent in northern India. However high frequency of consanguineous marriages is found among various group of populations of south India, specially from the state of Andhra Pradesh. A number of researchers like Sanghvi (1966), Dronammaraju and Meera Khan (1960,1961), Reid (1973), Veerraju (1973), Pingle (1975), Reddy (1978), Reddy and Naidu (1978), Reddy and Rao (1978) among different population

groups of Andhra Pradesh. In this paper an attempt is made to present the frequency of consanguineous marriages and its decadal distribution in a small primitive mendelian population named Thoti inhabiting the Adilabad district of Andhra Pradesh.

SUBJECTS AND METHODS

The name 'Thoti' is based on the traditional occupation of their women, which is tattooing. Government of India in 1983 recognized this tribe as primitive tribal population, and it belongs to proto-Australoid stock. According to the 1991 census, Thoti in Andhra Pradesh numbered 3654 persons and majority of them i.e., 1792 (49.04%) lived in Adilabad district only.

18 villages belonging to 11 mandals of Adilabad district were selected for the present study keeping in view the concentration of the Thoti families there. 246 ever-married women belonging to the age group 15-55 were selected randomly. Structured questionnaire followed by interview method was employed to gather the relevant information. Cross-checks were made to verify the information gathered. The age at marriage was calculated by subtracting the year at data collection [constant] with marital duration in completed years. The marital duration was estimated by subtracting present age with age at marriage. The distribution of consanguinity as well as its decadal trend among this population is shown in tables 1.1 to 1.3.

Table 1.1 shows the distribution of different types of marriages and inbreeding coefficient among the Thoti of Andhra Pradesh. Analysis of the table shows that 77.64% of Thoti practised consanguineous marriages and there was a great preference for first cousin marriages

(56.10%). Among the first cousin marriages, maternal uncle's son accounted for 29.27% of marriages, while paternal aunt's son accounted for 26.83% indicating the preference for maternal uncle's son. The incidence of marriage with maternal uncle was only 0.40 %. The overall coefficient of inbreeding for autosomal genes was found to be 0.0356 while that for sex linked genes it was 0.034. The coefficient of inbreeding for sex-linked gene is found to be lower than that for autosomal gene indicating the preference for matrilineal type of cross-cousin marriages in this population, when, female is considered as ego, which is in contradistinction to Sanghvi's (1966) observation that matrilineal cross-cousin marriages contribute to sex linked gene while patrilineal cross-cousin marriages do not contribute to sex-linked gene when male is considered as ego. The coefficient of inbreeding for the category beyond first cousin was not

calculated since it was difficult to ascertain whether the marriage was of matrilineal or patrilineal type. The table shows that patrilineal cross-cousin marriages only contribute to coefficient of inbreeding for sex-linked gene while matrilineal cross-cousin type does not contribute to it.

Trend of Consanguinity Among the Thoti

Table 1.2 shows the trend of consanguineous marriages among the Thoti. The table shows that a high degree of consanguinity has been practised by this tribal population during the past more than 4 decades, the range being 75.00 - 81.82 percent (also see figure 1.1). Among the consanguineous marriages, first cousin marriage was the most preferred one. Among the first cousin marriage there was a preference for paternal aunt's son from 1957 through 1977. After that they showed preference for maternal

Table 1.1: Distribution of types of marriages and the inbreeding coefficients among the Thoti

Type of Marriage	Marriage			Inbreeding Coefficient Autosomal (Fai)	Average Inbreeding Coefficient Autosomal (Ci Fai)	Inbreeding Co-efficient Sex-linked (Fsi)	Average Inbreeding Coefficient Sex-linked (Ci Fsi)
	Number	Percentage	Proportion (Ci)				
1. Maternal uncle	01	0.40	0.004	0.125	0.0005	0.125	0.0005
2. First Cousin (Total I+II)	138	56.10	-	-	-	-	-
I. Maternal Uncle's son	72	29.27	0.293	0.0625	0.0183	0.000	0.000
II. Paternal Aunt's son	66	26.83	0.268	0.0625	0.0168	0.125	0.0335
3. Beyond First Cousin	52	21.14	0.211	-	-	-	-
Total Consanguinity (1+2+3)	191	77.64	0.776	-	0.0356	-	0.0340
B. Non-Consanguineous	55	22.36	0.224	-	-	-	-
Total (A+B)	246	100.00	1.000	-	0.0356	-	0.0340

Table 1.2: Trend of Consanguineous Marriages among the Thoti

Year of Marriage	Total No. of Marriages	Consanguineous Marriages First Cousin								Total Consanguinity		Non-consanguineous Marriages	
		Uncle niece Marriage		Maternal Uncle's son		Paternal Aunt's son		Beyond First cousin		No	%	No	%
		No	%	No	%	No	%	No	%				
< 1957	34	-	-	10	29.41	13	38.24	4	11.76	27	79.41	7	20.59
1958-1967	27	-	-	6	22.22	7	25.93	8	29.63	21	77.78	6	22.22
1968-1977	44	-	-	13	29.55	15	34.09	8	18.18	36	81.82	8	18.18
1978-1987	88	1	1.14	29	32.95	19	21.59	17	19.32	66	75.00	22	25.00
1988-1997	53	-	-	14	26.42	12	22.64	15	28.30	41	77.36	12	22.64

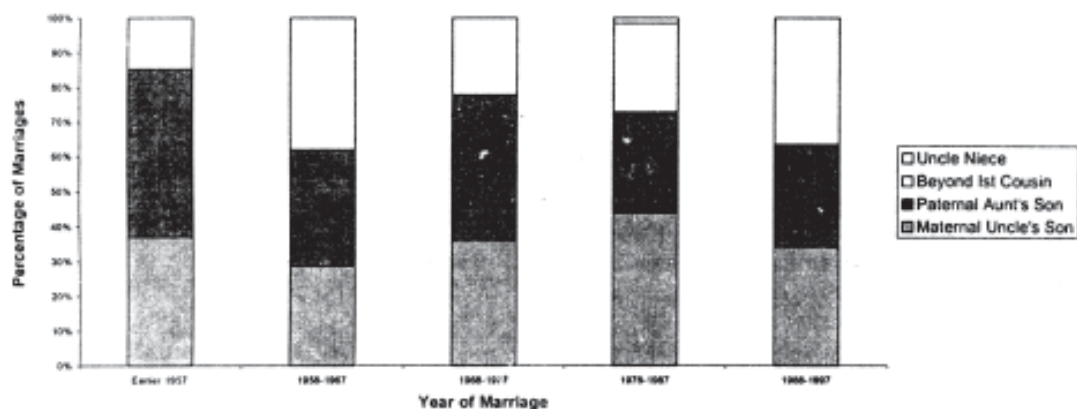


Fig. 1.1. Trend of consanguineous marriages among the Thoti population

uncle's son from 1977 to 1997. Only one case of uncle-niece marriage was reported during the decade 1978-1987, while no uncle-niece marriage was found in other decades. During the last four decades and more, overall percentage of

consanguineous marriages was never less than 75.00%, the highest (81.82%) being during 1968-1977. Interesting fact is that this percentage increased and then decreased in alternate decades during the last 4-5 decades.

Table 1.3: Distribution of consanguinity and coefficient of inbreeding among tribals of Andhra Pradesh

S. No.	Tribe	District	Total percentage of consanguinity	First cousin %	Coefficient of Inbreeding		Authors
					Autosomal	Sex linked	
1.	Andh	Adilabad	22.20	21.20	0.014	0.025	Pingle (1983)
2.	Bagathas	Vishakhapatnam	62.70	97.00	0.043	0.060	Andhra University report quoted by Veeraju (1978)
3.	Chintapalli Valmiki	-do-	69.17	-	-	-	-do-
4.	Gadabas	-do-	60.17	57.04	0.039	-	-do-
5.	Gond	Hyderabad	-	-	0.022	-	Nair and Murty (1977)
6.	Kolam-1	Adilabad	20.00	15.00	0.015	0.021	[c.f. Basu 1994 b]
7.	Kolam-2	-do-	45.60	45.23	0.029	0.043	Chakravarty (1968)
8.	Konda Reddis 1	Rampachodavaram	51.80	40.34	0.039	0.050	Pingle (1983)
9.	Konda Reddis 2	Adda Tigala	61.84	54.9	0.040	0.060	Veeraju (1973)
10.	Konda Kammaras	East Godavari	65.56	38.41	0.058	0.070	Veeraju (1973)
11.	Koya Doras-1	Rampachodavaram	51.3	27.92	0.047	0.054	Andhra University report quoted by Veeraju (1978)
12.	Koya Doras-2	Adda Tigala	70.60	59.19	0.040	0.067	Veeraju (1973)
13.	Madiga	Hyderabad	-	-	0.020	-	Andhra University report quoted by Veeraju (1978)
14.	Mathura	Adilabad	6.50	5.41	0.005	0.006	Nair and Murty (1977)
15.	Paderu Valmiki	Vishakhapatnam	52.11	46.22	0.036	0.048	(c.f. Basu 1994b)
16.	Pardhans	Adilabad	53.50	53.50	0.033	0.056	Pingle (1973)
17.	Raj Gond	Adilabad	34.50	34.50	0.022	0.034	Andhra University report quoted by Veeraju (1978)
18.	Savaras	Srikakulam	72.00	-	-	-	Pingle (1983)
19.	Kolam	Adilabad	76.00	73.31	0.0348	0.0332	-do-
20.	Thoti	-do-	77.64	56.10	0.0356	0.0340	Andhra University report quoted by Veeraju (1978)
							Saraswathy, 2000 (present study)

Comparison with Other Tribal Populations of Andhra Pradesh

Table 1.3 shows the distribution of consanguinity among other tribal populations of Andhra Pradesh. When the consanguinity rate of the presently studied Thoti population is compared with that of the other tribal populations it is found that the Thoti have the highest percentage of consanguinity among all these tribal populations of Andhra Pradesh. Among the consanguineous marriages, when first cousin marriage alone was taken for comparison it was found that only Bagathas of Vishakhapatnam, Koya Doras - 2 of Adda Tigala and Kolam - 3 of Adilabad had the higher percentages than the Thoti while all other tribal populations had lower percentages of first cousin marriages. The inbreeding coefficient for autosomal and sex-linked genes is found to be respectively higher among Bagathas, Gadabas, Konda Reddis 1 and 2, Konda Kammaras, Koya Doras 1 and 2 and Paderu Valmiki than that of the Thoti. But Andh, Kolam-1, Kolam-3 and Mathura had respectively lower values than that for the Thoti. Gond, Madiga, Pardhan and Raj Gond had lower coefficient of inbreeding for autosomal genes while Kolam-2 and Pardhan had higher coefficient of inbreeding for sex-linked gene than that for the Thoti, while, in Raj Gonds coefficient of inbreeding for sex linked gene is quite similar to that of the Thoti. When coefficient of inbreeding of Thoti is compared with those of other tribal populations of Adilabad district it is found that inbreeding coefficient, both for autosomal and sex linked genes is lower among all other tribal populations than among the Thoti, excepting Pardhans and Kolam-2 whose inbreeding coefficients for sex-linked gene are found to be respectively higher than that for Thoti, while among Raj Gonds it was quite similar to that of Thoti.

REFERENCES

- Andhra University Reports.: Human Genetics and Physical Anthropology Field Reports*, Andhra University, Waltair, India (Unpublished) (1972, 1975, 1976, 1977).
- Basu, S.K.: *Genetic Disorders and Health Care*. Shree Kala Prakashan, Delhi (1994).
- Census of India. Andhra Pradesh Part XII-A and B. District Census Handbook, Adilabad Village and Town Directory*. Director of Census Operations, A.P. (1991).
- Chakravorti, M.R.: Consanguinity in India. *Z. Morph. Anthropol.*, **60**: 70-183 (1968).
- Dronamraju, K.R. and Meera Khan, P.: Inbreeding in Andhra Pradesh. *J. Hered.*, **51**: 239-242 (1961).
- Dronamraju, K.R. and Meera Khan, P.: The frequency and effects of consanguineous marriages in Andhra Pradesh. *J. Genet.*, **13**: 387-401 (1961).
- Pingle, U.: A comparative analysis of meeting system and marriage distance patterns between five tribal groups of Utnoor Taluk, Adilabad district of Andhra Pradesh. *Proc. 2nd Conf. Ind. Soc. Hum. Genet.*, Bombay (1975).
- Pingle, U.: A comparative analysis of mating systems and marriage distance patterns between five tribal groups of Utnoor Taluk, Adilabad district of Andhra Pradesh. *Soc. Biol.*, **30**: 67-74 (1983).
- Naidu, G.P.: Effects of consanguinity on fertility and mortality in Gampasatt Kammas of Andhra Pradesh. In: *Medical Genetics in India*, I.C. Verma (Ed.). Aurora Enterprises, Publication Division, Pondicherry (1978).
- Reddy, V.R. and Rao, P.A.: Effects of parental consanguinity on fertility, mortality and morbidity among the Pattusalis of Tirupati, South India. *Hum. Hered.*, **28**: 226-234 (1978).
- Reddy, P.G.: Effects of consanguineous marriages on fertility and infant mortality among the Kapu and Mala of Southern Andhra Pradesh. *Abs. publ. in X International Congress of Anthropological & Ethnological Science*, Delhi. (1978).
- Reid, R.M.: Social structure and inbreeding in a South Indian caste. In: *Genetic Structure of Populations*. N.E. Morton (Ed.). University of Hawaii, Honolulu (1973).
- Sanghvi, L.D., Varde, D.S. and Master, H.R.: Frequency of consanguineous marriages in twelve endogamous groups in Bombay. *Acta Statist. Med.*, **6**: 41-49 (1956).
- Sanghvi, L.D.: Inbreeding in the rural districts of Andhra Pradesh. *Eugen. Quart.*, **13**: 291-293 (1966).
- Saraswathy, K.N.: *Demo-Genetic dynamics of Kolam Tribe of Andhra Pradesh*. Unpublished Ph.D. thesis, submitted to the Dept. Anthropology, University of Delhi. (2000).
- Veerraju, P.: Inbreeding in coastal Andhra Pradesh. *Proc. Int. Sym. Hum. Genet.*, Andhra University, Waltair (1973).