

Social, Geographic, Linguistic and Temporal Changes in Consanguinity Among Sixteen Tribes of Central India

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ABSTRACT The paper reports on the social, geographical, linguistic and temporal changes in consanguinity among 3232 married couples belonging to 16 tribes of Orissa, Madhya Pradesh and Maharashtra. The inter-tribe variation in total consanguineous marriages is strikingly large (range 0.45 to 46.5%; series average 22.86%). The matrilineal cross-cousin marriages are most preferred (14.2%) followed by patrilineal (7.52%) and uncle-niece (1.14%). The coefficient of inbreeding (F) ranges between 0.001 and 0.029 (series average 0.014). A considerable heterogeneity exists between the districts for consanguineous marriages. The Dravidian speaking tribes show highest frequency of consanguineous marriages (27.26%) followed by Indo Aryan (17.38%) and Austro-Asiatic (7.75%) speaking tribes. A consistent declining trend in consanguinity from older to younger generations is seen among a majority of the tribes; there is nearly 50% reduction from the oldest generation (28.9%) to the youngest generation (15%). The pattern of variation in inbreeding observed among the 16 tribes of Central India can best be understood and interpreted by considering the geographic location of the tribes, their linguistic affiliations and socio-economic development in the region.

INTRODUCTION

The wide prevalence of consanguineous marriages in Indian populations (in particular South India) have attracted the attention of anthropologists, biologists, and medical geneticists since long. Studies numbering over 200 carried out among a large number of populations, spread all over the country, have contributed significantly in understanding geographic, social and religious variation in consanguinity as well as its social and biological implications (for comprehensive review and literature on the subject see Sanghvi, 1966; Roychoudhury, 1976; Rao, 1984; Reddy, 1993; Malhotra and Vasulu, 1993).

A scrutiny of the vast literature, however shows that hardly any comprehensive and systematic studies on population structure and biological characters have been undertaken among the tribes of Central India. This region is inhabited by nearly 50 per cent of all the tribal population in the country. There is perhaps no region in the country that harbours such a rich array of cultural elements as this region.

Linguistically, in the region there are speakers of Austro Asiatic, Dravidian and Indo-Aryan language families. The region is very rich in natural resources, and a wide diversity is seen in resource use patterns-shifting agriculture, hunting and gathering, various artisanal activities, etc.

To fill in the above lacunae, the Indian Statistical Institute in collaboration with Bremen University, Bremen, Germany and Sambalpur University, Sambalpur, during Jan' 89- Nov'90, undertook a multidisciplinary population genetic project among several tribes of Orissa, Madhya Pradesh and Maharashtra. As a part of the project, data on consanguinity were also collected. This paper reports on the social, geographical, linguistic and temporal changes in consanguinity among 16 tribes of Orissa, Madhya Pradesh and Maharashtra.

MATERIAL AND METHOD

Altogether 3232 married couples belonging to 16 tribes were interviewed for ascertaining the consanguinity status. In all cases the consanguinity status was established by using genealogical method. The responses were classified as (1) unrelated (where no consan-

guinity could be established), (2) first cross-cousin matrilineal and patrilineal marriages; and (3) maternal uncle-niece marriages. As expected, parallel-cousin marriages were absent in these populations.

The names of the 16 tribes studied, their State/district affiliation, numerical strength (Census 1971), and the languages they speak are given in table 1, and their geographical location is shown in figure 1.

The inbreeding coefficient was calculated as:

$F = \sum P_i F_i$, where P_i is the proportion of each type of consanguineous marriage and F_i inbreeding coefficient *i.e.*, the probability that two genes in the offspring are identical by descent from one common ancestor.

Table 1: Distribution of the 16 tribes by state, district, numerical strength and linguistic affiliation

State/District	Tribe	Population size District wise (Census 1971)	Language Family
ORISSA			
Kalahandi	Deshia Khond	114644	Dravidian
	Raj Gond	123778	Dravidian
	Savara	4148	Austro-Asiatic
Koraput	Gadaba	46237	Austro-Asiatic
	Konda Dora	8129	Dravidian
	Kuvi Khond	325144	Dravidian
	Paroja	193736	Dravidian
Sambalpur	Binjhal	50280	Indo Aryan
	Kisan	87792	Dravidian
MADHYA PRADESH			
Bastar	Bhatra	71095	Indo Aryan
	Dhurwa 1	3 858 654	Dravidian
	Halba	57072	Indo Aryan
	Maria Gond 1		Dravidian
	Muria 1		Dravidian
MAHARASHTRA			
Gadchiroli	Maria Gond 2	203905	Dravidian
	Raj Gond 2		Dravidian

1 and 2: Population figures were not available separately for these tribes, instead were available only for Gond groups of Bastar and Gadchiroli districts.

The temporal changes in the consanguinity levels were examined by disaggregating the data in to four generations. As per the suggestion of Glass (1968), average age of parenthood was taken to represent a generation. Accordingly four generations were discerned in the present series as: (I) >65 years, (II) 44-65 years, (III) 22-43 years, and (IV) <22 years. The statistical significance of change in consanguinity between generations was tested by using 't' test statistics after Rao (1973). The formula used was

$$T = \frac{\sum_{i=1}^k n_i p_i^2 - NP^2}{P(1-P)}$$

where $\sum n_i = N$ and P_i are respectively size and rate of nonconsanguineous marriages of the population and P is respectively weighted mean of the generation and K is the number of generations; d.f = $K-1$.

RESULTS

The data on consanguinity have been analysed under five heads: (1) Social variation; (2) Geographical variation; (3) Linguistic variation; (4) Variation in inbreeding coefficient, and (5) Temporal changes.

1. Social Variation

The incidence of different types of consanguineous marriages along, with the inbreeding coefficients among the 16 tribes are presented in table 2. The inter-tribe variation in total consanguineous marriages is strikingly large, it varies from less than 1% in Binjhal of Orissa to 46.5% in Maria Gond of Madhya Pradesh (Fig.2). In the pooled series of 3232 marriages, nearly one-fourth (22.86%) are consanguineous. There are three types of consanguineous matings—both types of cross-cousin and maternal uncle-niece—that are prevalent in varying frequencies among these tribes. The matrilineal are most preferred and

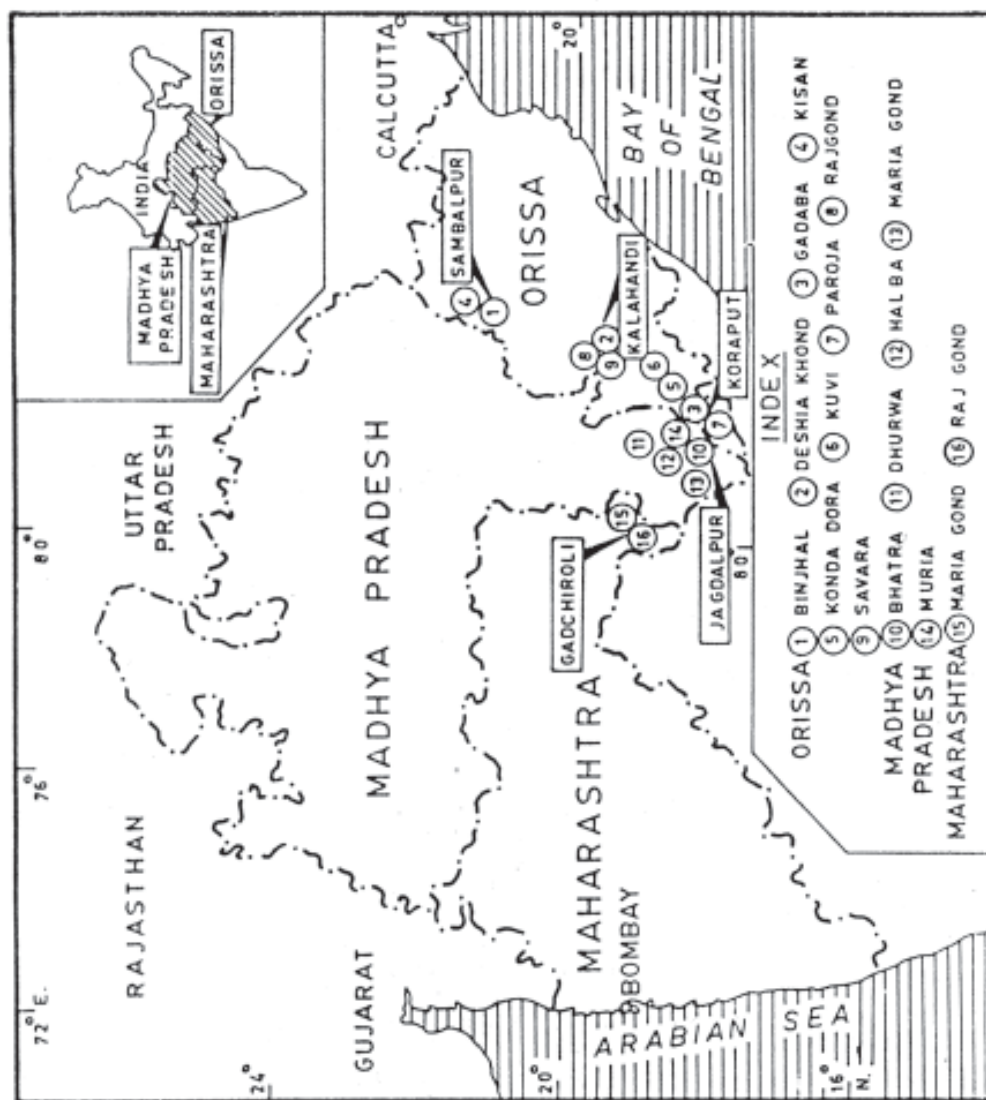


Fig. 1. Geographical location of the 16 tribal population in Orissa, Madhya Pradesh and Maharashtra

Table 2: Incidence of consanguineous marriages and inbreeding coefficient (F) among 16 tribal populations

State/District	Tribe	N	ML	PL	UN	Total	F
ORISSA							
Kalahandi	Deshia Khond	199	8	8	3	19	0.007
		%	4.02	4.02	1.51	9.50	
	Raj Gond	201	39	28	—	67	0.021
		%	19.40	13.93	0.00	33.33	
	Savara	208	8	13	—	21	0.006
		%	3.85	6.25	0.00	10.10	
Koraput	Gadaba	205	11	—	—	11	0.003
		%	5.37	0.00	0.00	5.37	
	Konda Dora	202	17	17	14	48	0.019
		%	8.42	8.42	6.93	23.76	
	Kuvi Khond	193	54	14	—	68	0.022
		%	27.98	7.25	0.00	35.23	
Sambalpur	Paroja	200	14	7	3	24	0.008
		%	7.00	3.50	1.50	12.00	
	Binjhal	221	1	1	—	2	0.001
		%	0.45	0.45	0.00	0.90	
	Kisan	204	9	9	—	18	0.006
		%	4.41	4.41	0.00	8.82	
MADHYA PRADESH							
Bastar	Bhatra	201	39	25	—	64	0.020
		%	19.40	12.44	0.00	31.84	
	Dhurwa	193	42	14	13	69	0.027
		%	21.76	7.25	6.74	35.75	
	Halba	200	21	21	—	42	0.013
		%	10.50	10.50	0.00	21.00	
Maharashtra	Maria Gond	200	60	33	—	93	0.029
		%	30.00	16.50	0.00	46.50	
	Muna	200	29	15	—	44	0.014
		%	14.50	7.50	0.00	22.00	
MAHARASHTRA							
Gadchiroli	Maria Gond	192	48	30	4	82	0.028
		%	25.00	15.63	2.08	42.71	
	Raj Gond	213	59	8	—	67	0.020
		%	27.70	3.76	0.00	31.46	
Total		3232	459	243	37	739	0.014
		%	14.20	7.52	1.14	22.86	

ML = Matrilateral; PL = Patrilateral; UN = Uncle-niece

are present in all the tribes. Its frequency ranges from as low as 0.45% in Binjhal to 30.0% in Maria Gond of Maharashtra with a series average of 14.2%. The next preferred type is patrilineal cross-cousin marriage. Except among the Gadaba of Orissa, it is found in all the tribes and depicts a range between 0.45% in Binjhal and 16.5% in Maria Gond of Madhya Pradesh; the series average being 7.52%. The pattern of variation in uncle-niece marriages is highly noteworthy; these are absent in 11

tribes, and among the remainder 5 tribes the incidence varies from 1.5% in Paroja to 6.93% in Konda Dora (both tribes are from Orissa) and consequently the series average is rather low (1.14%).

2. Geographical Variation

The geographic variation was examined by aggregating the data separately for each of the 5 districts from which the samples were obtained

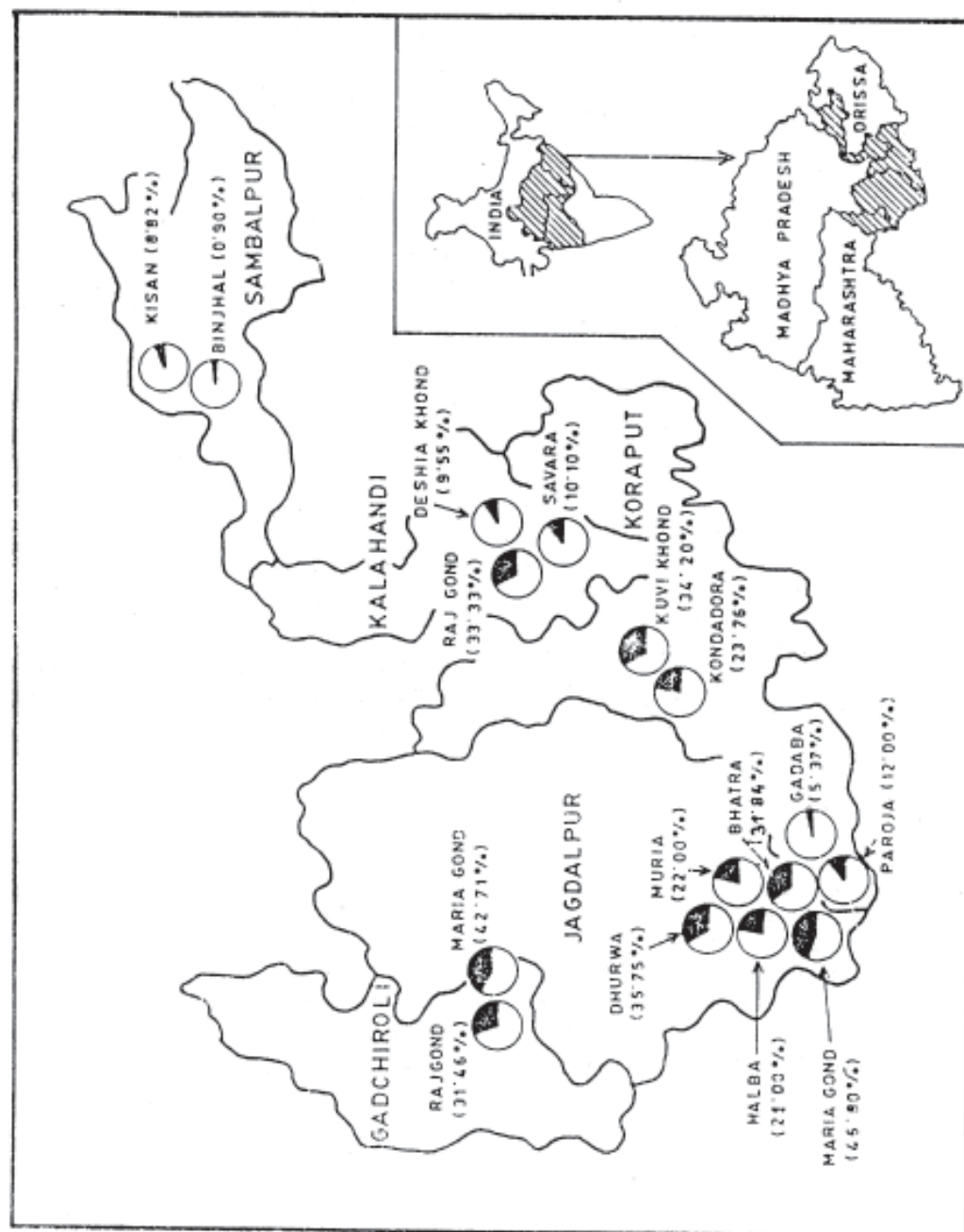


Fig. 2. Incidence of total consanguineous marriages among the 16 tribal populations of Orissa, Madhya Pradesh and Maharashtra

Table 3: Distribution of consanguineous marriages and F in 5 districts of Orissa, Madhya Pradesh and Maharashtra

State/ District	N	ML	PL	UN	Total	F
ORISSA						
Kalahandi	608	55	49	3	107	0.011
	%	9.05	8.06	0.49	0.17	
Koraput	800	96	38	17	151	0.013
	%	12.00	4.75	2.12	18.87	
Sambalpur	425	10	10	—	20	0.003
	%	2.35	2.35	0.00	4.71	
MADHYA PRADESH						
Bastar	994	191	108	13	312	0.020
	%	19.21	10.86	1.31	31.39	
MAHARASHTRA						
Gadchiroli	405	107	38	4	149	0.024
	%	26.42	9.38	0.99	36.79	
Total	3232	459	243	37	739	0.014
%	100	14.20	7.52	1.14	22.86	

(Table 3). The lowest incidence of total consanguinity (4.71%) is seen in Sambalpur district of Orissa, whereas the highest (36.79%) is recorded in Gadchiroli district of Maharashtra. Results of inter-district comparisons presented in table 4 establish a high degree of heterogeneity between the districts. The geographical plot (Fig.3) suggests an appreciable increase in consanguineous marriages in the east to west direction.

3. Linguistic Variation

As mentioned above, the 16 tribes were affiliated to one of the three language families. The data were re-arranged as shown in table 5, according to language families. It is evident that the Dravidian speaking tribes show a high incidence of such marriages (average 27.26%) and the Austric speaking tribes the lowest (average 7.75%); the Indo-Aryan speaking tribes occupy an intermediate position (17.38%). The uncle-niece marriages are present only among the Dravidian speaking tribes. Unlike the Dravidian speakers where the matrilineal cross-cousin is the most preferred type of mating (17.25% of all marriages), among the tribes

Table 4: Chi-square values for interdistrict variation in the frequency of consanguineous marriages

District	Kala- handi	Koraput	Sambal- pur	Bastar	Gad- chiroli
Kalahandi	—	0.38	38.56*	37.14*	47.41*
Koraput		—	46.39*	104.98*	46.15*
Sambalpur			—	118.26*	131.65*
Bastar				—	0.26
Gadchiroli					—

* $P < 0.05$

Table 5: Distribution of consanguineous marriages and F in 3 Language families of Orissa, Madhya Pradesh and Maharashtra

Language families	No of tribes	N	ML	PL	UN	Total	F
Dravidian	11	2197	379	183	37	599	0.016
		%	17.25	8.33	1.68	27.26	
Indo-Aryan	3	622	61	47	—	108	0.011
		%	9.81	7.56	0.00	17.38	
Austro- Asiatic	2	413	19	13	—	32	0.005
		%	4.60	3.15	0.00	7.75	

speaking the other two families, such preference is lacking as both matrilineal and patrilineal occur in comparable frequencies.

4. Variation in Inbreeding Coefficients

Using frequencies of different types of matings, inbreeding coefficients (F) for autosomal genes were computed separately for each tribe, district as well as language families (Tables 2, 3, and 5, and Fig. 4). Since the frequency of uncle-niece marriages in these tribes is rather low, it is expected that the pattern of variation observed in total consanguineous marriages, will also be observed in F. The pattern of variation in F between the tribes, districts and language families, in fact, is in agreement with such an expectation: F values between the tribes show a wide range of variation (0.001 in Binjhal to 0.029 in Maria Gond, series average being 0.014); between districts it ranges from 0.003 in Sambalpur district to 0.024 in Gadchiroli district; and

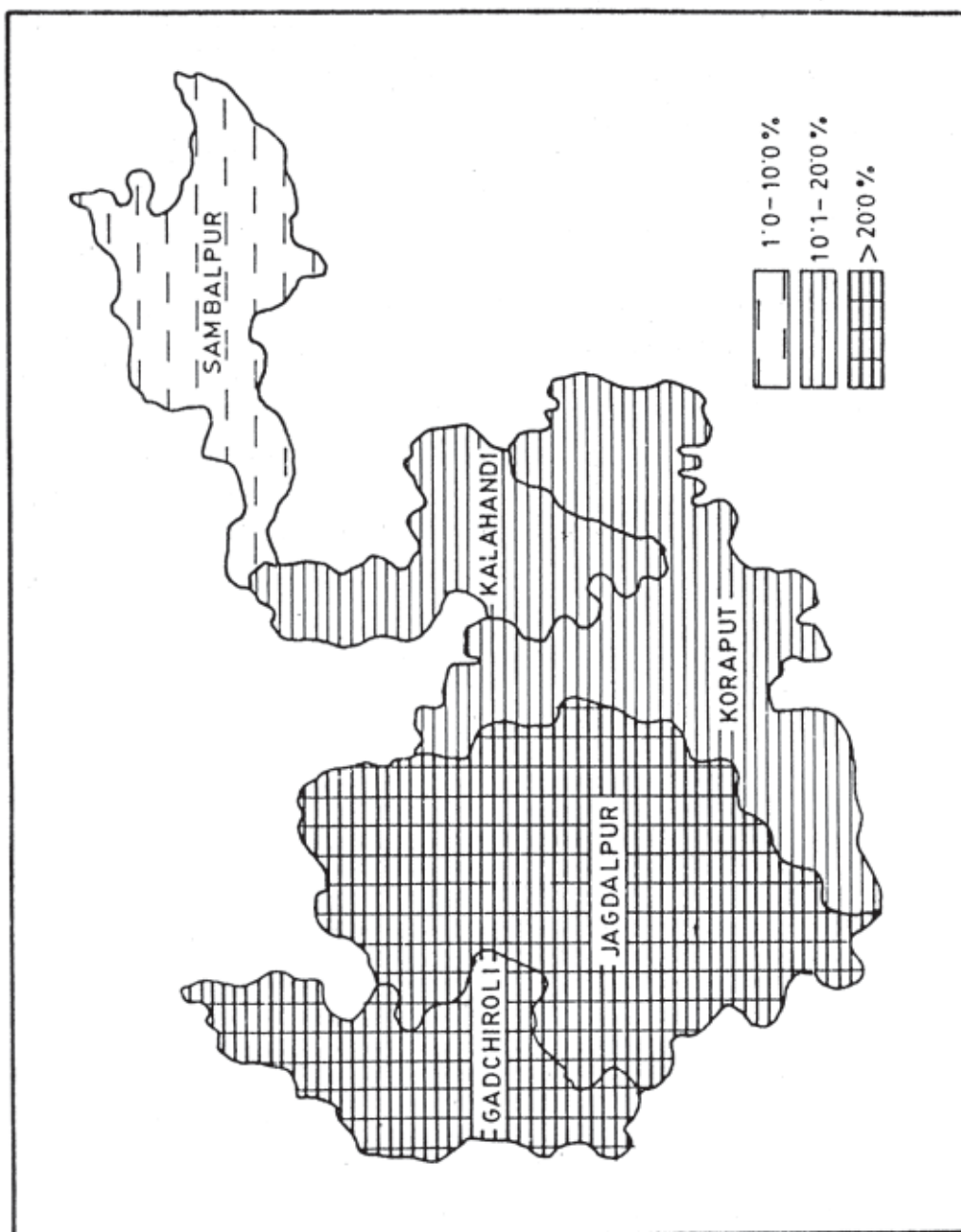


Fig. 3. Incidence of total consanguineous marriages in different districts of Orissa, Madhya Pradesh and Maharashtra

between language families it varies from 0.005 in Austric to 0.016 in Dravidian.

5. Temporal Changes

Temporal changes in consanguinity were analysed: (i) by disaggregating the total number of marriages in to four generations and then computing the proportion of consanguineous marriages for each generation (Table 6), (ii)

by computing inbreeding coefficients for each generation (Table 7), and (iii) by employing 't' statistics after Rao (1973) to the data presented in table 6.

Out of the 16 tribes, 23 show a consistent declining trend in the frequency of consanguineous marriages from older to younger generations (Fig. 5). The three tribes which deviate from this practice of consanguinity is

Table 6: Incidence of consanguineous and non-consanguineous marriages by generations

Population	Generation											
	I			II			III			IV		
	N	C	NC	N	C	NC	N	C	NC	N	C	NC
ORISSA												
Binjhal	47	0	47	75	0	75	90	2	88	9	0	9
	%	0.0	100.0		0.0	100.0		2.2	97.8		0.0	100.0
Deshia Khond	26	4	22	68	6	62	86	8	78	19	1	18
	%	15.4	84.6		8.8	91.2		9.3	90.7		5.3	94.7
Gadaba	21	3	18	62	5	57	104	3	101	18	0	18
	%	14.3	85.7		8.1	91.9		2.9	97.1		0.0	100.0
Kisan	24	4	20	49	5	44	103	8	95	28	2	26
	%	16.7	83.3		10.2	89.8		7.8	92.2		7.1	92.9
Konda Dora	27	6	21	81	16	65	85	24	61	9	2	7
	%	22.2	77.8		19.7	80.3		28.2	71.8		22.2	77.8
Kuvi Khond	28	11	17	63	23	40	86	30	56	16	4	12
	%	39.3	60.7		36.5	63.5		34.9	65.1		25.0	75.0
Paroja	27	5	22	67	7	60	86	9	77	20	3	17
	%	8.5	81.5		10.4	89.6		10.5	89.5		15.0	85.0
Raj Gond	30	12	18	103	35	68	56	17	39	12	3	9
	%	40.0	60.0		34.0	66.0		30.4	69.6		25.0	75.0
Savara	18	4	14	70	8	62	102	8	94	18	1	17
	%	22.2	77.8		11.4	88.6		7.8	92.2		5.6	94.4
MADHYA PRADESH												
Bhatra	37	14	23	93	32	61	55	15	40	16	3	13
	%	37.8	62.2		34.4	65.6		27.3	72.7		18.8	81.2
Dhurwa	29	11	18	64	23	41	83	31	52	17	4	13
	%	37.9	62.1		35.9	64.1		37.4	62.6		23.5	76.5
Halba	32	9	23	88	20	68	58	10	48	22	3	19
	%	28.1	71.9		22.7	77.3		17.2	82.8		13.6	86.4
Maria Gond	43	20	23	78	37	41	68	32	36	11	4	7
	%	46.5	53.5		47.4	52.6		47.1	52.9		36.4	63.6
Muria	40	13	27	68	15	53	63	11	52	29	5	24
	%	32.5	67.5		22.1	77.9		17.5	82.5		17.2	82.8
MAHARASHTRA												
Maria Gond	43	19	24	66	29	37	72	31	41	11	3	8
	%	44.2	55.8		43.9	56.1		43.1	56.9		27.3	72.7
Raj Gond	37	12	25	69	23	46	88	29	59	19	3	16
	%	32.4	67.6		33.3	66.7		32.9	67.1		15.8	84.2
Total	509	147	362	1164	284	880	1285	268	1017	274	41	233
	%	28.9	71.1		24.4	75.6		20.9	79.1		15.0	85.0

N = Sample Size; C = Consanguineous marriages; NC = Non-consanguineous marriages

Table 7: Inbreeding coefficients by generations

Population	Generation				
	N	I	II	III	IV
Binjhal	221	0.000	0.000	0.001	0.000
Deshia Khond	199	0.010	0.005	0.008	0.003
Gadaba	205	0.009	0.005	0.002	0.000
Kisan	205	0.010	0.006	0.005	0.004
Konda Dora	202	0.014	0.017	0.023	0.013
Kuvi Khond	193	0.026	0.023	0.022	0.016
Paroja	200	0.011	0.007	0.008	0.008
Raj Gond (OR)	201	0.025	0.021	0.019	0.016
Savara	208	0.014	0.007	0.005	0.004
Bhatra	201	0.024	0.021	0.017	0.012
Dhurwa	193	0.024	0.022	0.033	0.015
Halba	200	0.018	0.014	0.011	0.008
Maria Gond (MP)	200	0.054	0.030	0.029	0.023
Muria	200	0.020	0.015	0.011	0.010
Muria Gond (MH)	192	0.028	0.027	0.026	0.017
Raj Gond (MH)	213	0.028	0.021	0.020	0.009
Total	3232	0.025	0.020	0.016	0.011

OR = Orissa; MP = Madhya Pradesh; MH = Maharashtra

not a general rule, the presence of two such marriages in generation III can be attributed to chance. Among the Konda Dora the magnitude of consanguinity remains more or less the same in all the generations. However, among the Paroja there is a perceptible tendency towards an increase; the frequency has increased from 8.5% in generation I to 15% in generation IV. The trend of decrease in consanguineous marriages over the last few decades in the tribes of Central India becomes very clear in the data aggregated over all the tribes. There is nearly 50% reduction from generation I (28.9%) to generation IV (15%). There is a consistent decrease of about 5% in each generation.

Predictably, except in a few cases where the frequency of uncle-niece marriages are high, the above observations are also corroborated by the analysis of F over generations are also corroborated by the analysis of F over generations. In the pooled data there is over 50% reduction in F from 0.025 in generation I to 0.11 in generation IV. Like in the consanguineous marriages, the F values also

Table 8: Temporal changes in consanguinity: Values of 't' test (after Rao, 1973)

Population	't' Values ¹
Binjhal	2.97
Deshia Khond	1.45
Gadaba	6.47
Kisan	2.02
Konda Dora	1.69
Kuvi Khond	0.97
Paroja	1.60
Raj Gond (OR)	1.22
Savara	4.00
Bhatra	2.69
Dhurwa	1.27
Halba	2.35
Maria Gond(MP)	0.47
Muria	3.71
Maria Gond (MH)	1.13
Raj Gond (MH)	0.52
Total	24.43*

1. d.f. = 3 * P<0.01

show a consistent decrease of about 5% in each generation.

The results of 't' test of significance (Table 8) show that the observed trend among all the tribes when considered individually, are statistically non-significant. However, in the

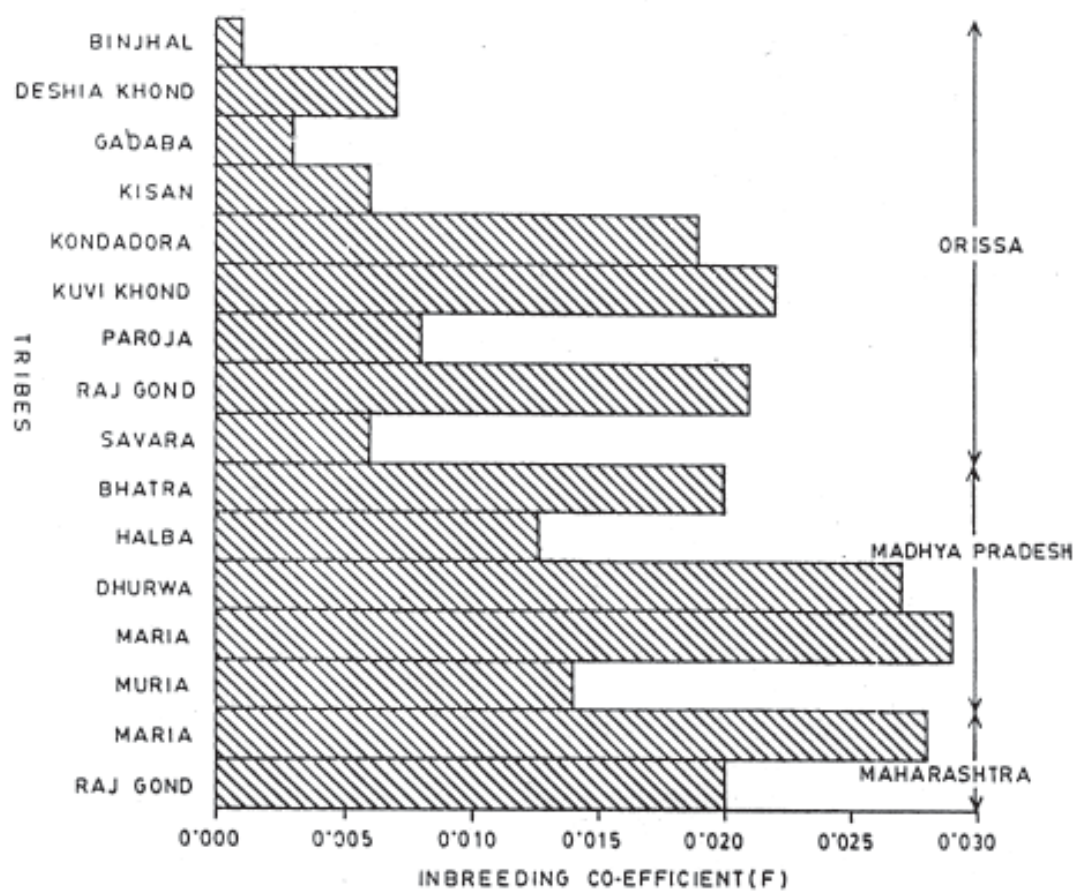


Fig. 4. Inbreeding coefficient among the 16 tribal populations of Orissa, Madhya Pradesh and Maharashtra

pooled data the temporal changes are highly significant ($t = 24.43$, $p < 0.01$, d.f.3.).

DISCUSSION

From the analysis presented in the preceding section the following main points emerge.

1. All the 16 tribes practice consanguinity. The prevalence rates of different types of consanguineous marriages and total consanguinity rates between the tribes show a considerable range of variation. Consequently the coefficient of inbreeding also shows wide inter-tribal variation.
2. While both types of cross-cousin marriages occurs in all the tribes, uncle-niece marriages are practiced by 5 tribes only.
3. A high degree of heterogeneity in consanguineous marriages occurs between the five districts.
4. Compared to Indo-Aryan and Austro-Asiatic speaking tribes, the Dravidian speaking tribes show significantly higher consanguinity.
5. In a majority of the tribes there is a perceptible decreasing trend in consanguinity.

The factors that can best explain the above results are the geographical location of the tribes, their linguistic affiliation and migrational and acculturation history. The five districts from where the 16 tribes have been sampled are: Sambalpur, Kalahandi and Koraput (all in Orissa), Bastar (Madhya Pradesh) and Gadchiroli (Maharashtra). These districts constitute a contiguous geographical stretch in Central India. Three of the five districts, namely, Koraput, Bastar and Gadchiroli share their southern borders with Andhra Pradesh. Sambalpur and Kalahandi districts are not directly connected with Andhra Pradesh. It is well established that there are certain preferences and prescriptions in the choice of spouses in Dravidian speaking states in India (Karve,

1953). It is therefore expected that populations living close to Andhra Pradesh will show higher incidence of consanguinity compared to those living away. The results of the present study are in complete agreement with this expectation as tribes of Koraput, Bastar and Gadchiroli districts have higher incidence of consanguinity than the populations of Sambalpur district located away from Andhra Pradesh.

The practice of uncle-niece marriages is a characteristic feature of the Dravidian Kinship system (Karve, 1953; Dumont, 1953) and therefore, it was expected that only the Dravidian speaking tribes in the present study will show such marriages. It is highly noteworthy that all the five tribes in which these are present speak Dravidian languages; among none of the Austric And Indo-Aryan speaking tribes this was detected. It appears that Kalahandi district in Orissa may represent the northern limits of the practice of uncle-niece marriages in the country.

The incidence of consanguinity in the present series is found to be much higher among the Dravidian speaking tribes than the Indo-Aryan and Austro-Asiatic speaking tribes. Since in northern India, where Indo-Aryan languages are spoken, and consanguineous marriages are usually tabooed, it was expected that among the Indo-Aryan speaking three tribes in the present study, namely, Bhatra and Halba of Bastar district, and Binjhal of Sambalpur district, the incidence of consanguineous marriages will be low. But contrary to this expectation, high frequency of such marriages are observed among the Bhatra (31.84%) and Halba (21%). The expectation is only satisfied in the Binjhals among whom the frequency is less than 1%. We are, however, unable to explain the low frequency of consanguineous marriages observed among the Austric speaking tribes living close to Andhra Pradesh and amidst dravidian speaking tribes. Is this a feature of the Austro-Asiatic kinship system? Further research among the 40 odd Austric tribes in the country will clarify the situation. This clearly

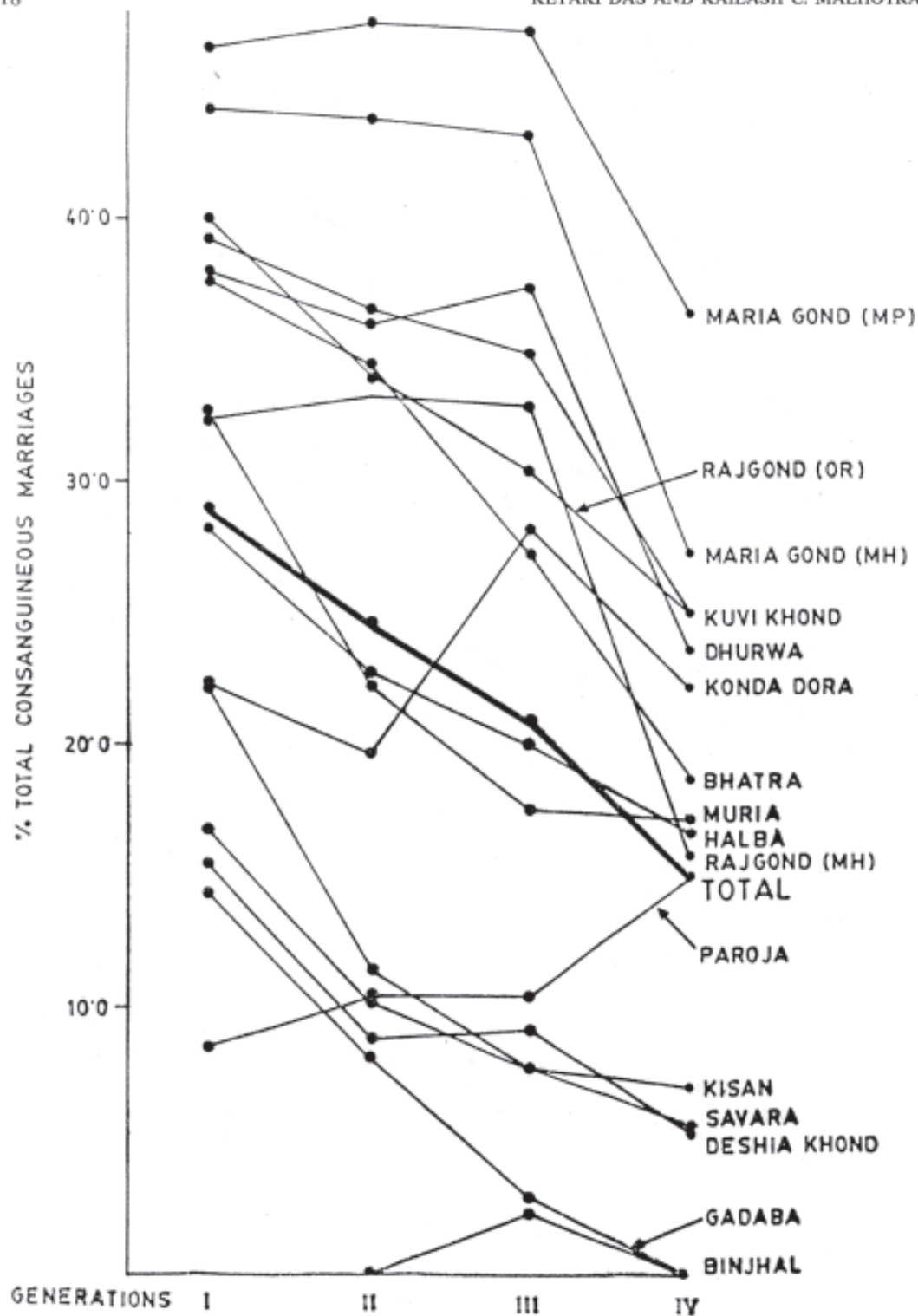


Fig. 5. Temporal changes in the frequency of total consanguineous marriages among the 16 tribes of Central India (OR=Orissa, MP=Madhya Pradesh and MH=Maharashtra)

demonstrates that the geographic/regional cultural influences are greater than the language affiliation especially in the states that share territories with different kinship systems. Earlier Malhotra (1984) had arrived at similar conclusion in his study among the Dhangars of the State of Maharashtra.

In a majority of the tribes a consistent declining trend in consanguinity is observed from older to younger generations. Although statistically speaking the observed trends fail to reach significant levels in all the tribes perhaps due to small sample sizes across generations, qualitatively they do suggest a slow and gradual change which is indeed real. This is substantiated by the fact that in the data pooled over tribes, the decline is statistically highly significant. These results, however, are in variance with earlier studies which found practically no decrease in consanguineous marriages either in rural or urban areas (Rao, 1984).

There could be various reasons behind the decline in inbreeding. However, intuitively three main factors can be discerned : (i) awareness of detrimental effects of inbreeding, (ii) demographic constraints, and (iii) over-all socio-economic development of the region. Since the literacy levels in the region even presently are less than 10%, the first factor need not to be considered.

The population sizes of most of the tribes in the present study are sufficiently large, and therefore are not likely to pose any demographic constraints in contacting kin marriages. Although data on the nature and extent of socio-economic changes that have occurred in the region were not specifically designed to be collected in the present study, field observations of qualitative nature undoubtedly suggest that communication network in the form of roads and transportation has enormously improved in the region during the last few decades. Also, in some parts of the region new job opportunities have been created as well as access to newer resources has been

enhanced. These changes have allowed an increase in contacts with people who live further away which in turn has led to an increase in number of potential mates (Calderon et al., 1993). The change has to some extent created socio-economic inequalities between tribes as well as between the families within tribes. This is reflected in the gradual decrease in the practice of bride-price and an increase in the practice of dowry. These changes would encourage some of the families to contact marriages with families of comparable socio-economic status irrespective of prior kinship ties (Reddy, 1993). We would, however, like to emphasize, as is apparent, the speculative nature of this analysis, and suggest that studies especially designed for the purpose should be undertaken in the region to discern relative roles of these factors in reducing consanguinity.

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REFERENCES

- Calderon, R., Pena, J.A., Morales, B. and Guevara, J.I.: Inbreeding patterns in the Basque country (Alava Province, 1831-1980). *Hum. Biol.*, 65: 743-770 (1993).
- Census of India. Office of the Director of Census India, New Delhi (1971).
- Dumont, L.: The Dravidian kinship terminology as an expression of marriage. *Man*, 53: 34-39 (1953).
- Glass, B.: On the evidence of random genetic drift in human population. *Am. J. Phys. Anthropol.*, 14: 544-55 (1956).
- Karve, I. : *Kinship Organisation in India*. Deccan college, Pune (1953).
- Malhotra, K.C.: Population structure among the Dhangar caste-cluster of Maharashtra, India, pp. 295-324, In: *The People of South Asia*. J.R. Lukacs (Ed.), Plenum, New York (1984).
- Malhotra, K.C. and Vasulu, T.S.: Structure of human populations in India. pp. 207-234 In: *Human Population Genetics*. P.P. Majumder (Ed.), Plenum, New York (1993).

- Rao, C.R.: *Advanced Statistical Methods in Biometric Research*. Haffner. John Wiley, New York (1973).
- Rao, P.S.S.: Inbreeding in India. pp. 239-268, In: *The People of South Asia*. J.R. Lukacs, (Ed.) Plenum, New York (1984).
- Reddy, P.G.: *Marriage Practices in South India*. University of Madras, Madras (1993).
- Roychoudhury, A.K.: Inbreeding in Indian population. *Trans. Bose Res. Inst.*, **39**: 65-76 (1976)
- Sanghvi, L.D.: Inbreeding in India. *Eugenics*, **13**: 291-301 (1966).