Risks in Consanguineous Marriages: An Isonymic Study

Pages with reference to book, From 270 To 277

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Abstract

The effects of consanguineous marriages in various isonymic groups have been investigated. The families like Qureshi, Malik, Jats and Sheikh show higher live-births, prenatal and postnatal loss, and percentage pregnancies in the first cousin and 'all related' parental relationships compared to other groups. Syed, Butt, and Mughals show higher percentage of prenatal and postnatal loss, livebirths, and pregnancies in unrelated parental relationships than other groups.
A highly significant correlation between prenatal loss and mean F of each isonymic group in 'all related' parental relationships indicates the depth of consanguinity varies with isonymic groups.
The results strongly suggest that preferred first cousin and close relative marriages within isonymic groups be abandoned (JPMA 31:269, 1981).

Introduction

In man, one of the most important fraction of total genetic load is revealed in the offspring of consanguineous marriages. This fraction is composed of tare deleterious variants which are thought to be mostly maintained in the papulation by mutation pressure. Inbreeding studies are a tool for detecting and measuring the genetic load {Freira Maia, 1964). The effects of consanguinity on such parameters as fertility, mortality and morbidity have been observed in European populations (Slatis et al., 1958; Sutter and Tabah, 1954), Japanese populations (Schull, 1958; Morton, 1958; Imaizumi et al., 1975; Yamaguchi et al., 1975), Indian populations (Sanghvi, 1966; Redely and Rao, 1978), and Sri Lanka population (Reid, 1976).
Tanaka and Tanimura (1977) found that products of consanguineous marriages tend to marry each other and a product of consanguineous marriage tend to marry a relative. Such consanguineous marriages lead to higher inbreeding level in the offspring of consanguineous unions than estimated from parental relationships only.
In Pakistan, marriages within Bradari (between close blood relations) are very common. Although marriages between first cousins are preferred but if proper mates are not available marriages very often tend to occur between close blood relations. The effects of consanguinity in various isonymic groups have been investigated in the present report.

Subjects and Methods

The data were collected from Lady Willing-don Hospital, Lahore by interviewing women who were admitted for delivery and for treatment of other diseases. The information collected from the subject included: family surname of spouses, their ages, their age of marriage and year of marriage, the number of living children, abortions, stillbirths and postnatal deaths.
The analysis of data includes the calculation of proportion of various parental relationships, percentage prenatal and postnatal deaths, mean F, and simple and partial correlations.
The study is based on the fifteen isonymic groups of the Arains, Awans, Bhattis, Butts, Chaudharys, Jats, Kakezais, Khans, Khokhars, Mughals, Qureshis, Rajpoots, Sheikhs and Syeds.

Results

The different parental relationships indenti-fied in the present data were double first cousin (DIG), first cousin (1C), first cousin once removed (12C), double second cousin (D2C), second cousin (2C), bradari distant relations (BDR), bradari (B), and unrelated relations (U). The percentage distribution of parental relationships are given in Table I.

Table I

Distribution of Consanguineous Marriages by Isonymy in Sample Lahore (Hospital) Population.

Family Surname		*PARENTAL RELATIONSHIPS*								
		D1C	*1C*	*1½C*	*D2C*	*2C*	*BDR*	*B*	*U*	*T*
Arain	%	1.77	30.09	7.08	—	3.54	8.85	24.78	23.89	—
	n	2	34	8		4	10	28	27	113
Awan		5.55	27.78	—	5.55	—	11.11	22.23	27.78	—
		1	5		1		2	4	5	18
Bhatti		4.35	30.43	4.35	6.52	—	8.70	17.39	28.26	—
		2	14	2	3		4	8	13	46
Butt		3.39	28.81	1.70	—	—	10.17	15.25	40.68	—
		2	17	1			6	9	24	59
Chaudhary		—	50.00	10.00	—	—	—	10.00	30.00	—
			5	1				1	3	10
Jat		5.77	36.53	—	3.85	5.77	5.77	17.31	25.00	—
		3	19		2	3	3	9	13	52
Kakezai		4.76	23.81	4.76	—	—	9.52	42.86	14.29	—
		1	5	1			2	9	3	21
Khan		1.85	25.93	1.85	7.41	7.41	11.11	9.26	35.18	—
		1	14	1	4	4	6	5	19	54
Khokhar		—	31.25	6.25	6.25	—	6.25	12.50	—	—
			1	1		1	1	2	—	16
Malik		—	44.44	—	5.56	—	5.56	11.11	33.33	—
			8		1		1	2	6	18
Mughal		—	25.00	2.50	2.50	—	20.00	20.00	30.00	—
			10	1	1		8	8	12	40
Qureshi		3.45	43.10	3.45	6.90	6.90	1.72	8.62	25.86	—
		2	25	2	4	4	1	5	15	58
Rajpoot		1.46	34.29	3.57	7.14	2.86	12.14	11.43	27.14	—
		2	48	5	10	4	17	16	38	140
Sheikh		1.10	32.97	4.40	3.30	3.30	15.38	23.07	16.48	—
		1	30	4	3	3	14	21	15	91
Syed		1.32	36.84	3.95	—	5.26	5.36	7.90	39.47	—
		1	28	3		4	4	6	30	76

73.33% of the total families indicated double first cousin marriages. Jats (5.77%) and Awans (5.55%) show the highest percentage of double first cousin marriages. Others which show this relationship fairly common are Kakezais (4.76%), Bhattis (4.35%), Qureshis (3.45%) and Butts (3.39%). Sheikhs show the least proportions (1.10%) of this relationship.

First cousin marriages are popular among Chaudharys (50.00%), Maliks (44.41%), Qureshis(43.10%), Syeds (36.84%), Jat (36.53%), Rajpoots (34.29%), Sheikhs (32.97%), Khokhars (31.25%), and Arains (30.29%).

First cousin once removed marriages were observed in 80.00% of the total families. The highest of these marriages are seen in the Arains (7.08%), Kakezais (4.76%), Sheikhs (4.40%), Bhattis (4.35%), Syeds (3.95%), Rajpoots (3.57%), and Qureshis (3.45%).

Double second cousin marriages are seen in 66.67% of the families. Among Rajpoots (7.14%), Khans

(7.41%), Qureshis (6.90%), Bhattis (6.52%), Khokhars (6.25%) and Awans (5.55%) these type of marriages are quite common.

Second cousin marriages are mostly seen in Khans (7.41%), Qureshis (6.90%), Jats(5.77%) and the Syeds (5.26%). 46.67% of the families indicate these marriages.

There are certain marriages where parents have close blood relations but their exact relationship cannot be established. In other words, they belong to the same isonymic group but the whole relationship is so complicated that it is difficult to trace back the exact ancestry. These type of marriages have been grouped into two classes (a) Bradari distant relations (b) Bradari relations. For practical purposes the spouses in both the categories are considered as not related and coefficient of inbreeding (F) has been assumed zero. Other type of marriages where spouses belong to different isonymic groups and ancestry and show absolutely no blood relations are the true 'unrelated marriages'.

Marriages of Bradari distant relations are common in Mughal (20.00%), Sheikh (15.39%), Rajpoort (12.14%), Awan (11.11%) and Khan family (11.11%).

Higher proportions of marriages within Bradari are seen in the Kakezai (42.86%), Arain (24.78%), Sheikh (23.07%), Awan (22.23%), Bhatti (17.39%) and Jat families (17.31%).

Unrelated type of marriages were common in families like the Butts (40.68%), Syeds (39.47%), Khokhars (37.50%), Maliks (33.33%), Chaudharys (30.00%), Khans (35.18%) and Mughals (30.00%).

Family size, percentage distribution of livebirths, prenatal loss, postnatal loss, total loss, total pregnancies, and mean F values in each isonymic group are given in Table II.

Table II

Percentage Distribution of Family Size (FZ), Livebirths (LB), Prenatal Loss (PL), Postnatal deaths (PD), Total Deaths (TD), and Total Pregnancies (TP) in Parental Relationships of Different Isonymic Group in Sample Lahore (Hospital) Population.

Family		*First cousin*	*Related*	*All related*	*Unrelated*	*Total*	$\overline{F}$
1—Khokhar	FZ	2.20	5.00	3.60	4.00	—	0.0512
	LB	18.33 (11)	41.67 (25)	60.00 (36)	40.00 (24)	60	
	PL	71.43 (5)	28.57 (2)	100.00 (7)	—	7	
	PD	—	28.57 (2)	28.57 (2)	71.43 (5)	7	
	TD	35.71 (5)	28.57 (4)	64.29 (9)	35.71(5)	14	
	TP	23.88 (16)	40.30 (27)	64.18 (43)	38.71 (24)	67	
	n	5	5	10	6	16	
2—Malik	FZ	2.25	4.00	2.83	3.30	—	0.0295
	LB	33.33 (18)	29.63 (16)	62.96 (34)	37.04 (20)	54	
	PL	75.00 (6)	12.50 (1)	87.50 (7)	12.50 (1)	8	
	PD	60.00 (3)	20.00 (1)	80.00 (4)	20.00 (1)	5	
	TD	69.23 (9)	15.385 (2)	84.615 (11)	15.385 (2)	13	
	TP	38.09 (24)	26.98 (17)	65.08 (41)	34.92 (22)	62	
	n	8	4	12	6	18	
3—Mughal	FZ	4.60	3.26	3.72	4.08	—	0.0175
	LB	29.30 (46)	39.49 (62)	68.79 (108)	31.21 (49)	157	
	PL	21.74 (5)	65.22 (15)	86.96 (20)	13.04 (3)	23	
	PD	35.71 (5)	21.43 (3)	57.14 (8)	42.86 (6)	14	
	TD	27.03 (10)	48.65 (18)	75.68 (28)	43.32 (9)	37	
	TP	28.33(51)	42.78 (77)	71.11 (128)	28.89 (52)	180	
	n	10	19	29	12	41	
4—Awan	FZ	3.40	2.63	2.92	4.80	—	0.0260
	LB	27.42 (17)	33.87 (21)	61.29 (38)	38.71 (24)	62	
	PL	28.57 (2)	57.14 (4)	85.71 (6)	14.28 (1)	7	
	PD	30.00 (3)	50.00 (5)	80.00(8)	20.00 (2)	10	
	TD	29.41 (5)	52.94 (9)	82.35 (14)	17.65 (3)	17	
	TP	29.41 (19)	36.23 (25)	63.77 (44)	36.23 (25)	69	
	n	5	8	13	5	18	
5—Qureshi	FZ	4.96	4.22	4.65	3.27	—	0.0355
	LB	49.80 (124)	30.52 (76)	80.32 (200)	19.68 (49)	249	
	PL	41.935 (13)	41.935 (13)	83.87 (26)	16.13 (5)	31	
	PD	61.90 (26)	2.20 (11)	88.10 (37)	11.90 (5)	42	
	TD	53.42 (39)	32.88 (24)	86.30 (63)	13.70 (10)	73	
	TP	48.93 (137)	31.78 (89)	80.71 (226)	19.28 (54)	280	
	n	25	18	43	15	58	
6—Rajpoot	FZ	2.94	3.79	3.39	3.19	—	0.0270
	LB	30.19 (141)	43.90 (205)	74.09 (346)	25.91 (121)	467	
	PL	27.46 (35)	41.76 (38)	80.22 (73)	19.78 (18)	91	
	PD	23.07 (9)	66.67 (26)	89.74 (35)	10.26 (4)	39	
	TD	33.85 (44)	49.23 (64)	83.08 (108)	16.92 (22)	130	
	TP	31.54 (176)	43.58 (243)	75.09 (419)	24.91 (139)	558	
	n	48	54	102	38	140	
7—Arain	FZ	3.29	3.31	3.30	3.59	—	0.0238
	LB	29.39 (112)	45.14 (172)	74.54 (284)	25.46 (97)	381	
	PL	47.50 (19)	57.75 (23)	80.00 (32)	20.00 (8)	40	
	PD	34.78 (16)	39.13 (18)	73.91 (34)	26.08 (12)	46	
	TD	36.46 (35)	42.71 (41)	79.17 (76)	20.83 (20)	96	
	TP	30.23 (130)	45.35 (195)	75.58 (325)	42.42 (105)	430	
	n	34	52	86	27	113	

Wright's (1922) formula was used for the calculation of mean F. The percentages were calculated by dividing the number in each parental relationship with the total of the row. Due to small sample size all parental relationships, except first cousin and unrelated categories, were combined together.

(43.10%), Syeds (36.84%), Jat (36.53%), Rajpoots (34.29%), Sheikhs (32.97%), Khokhars (31.25%),

and Arains (30.29%).
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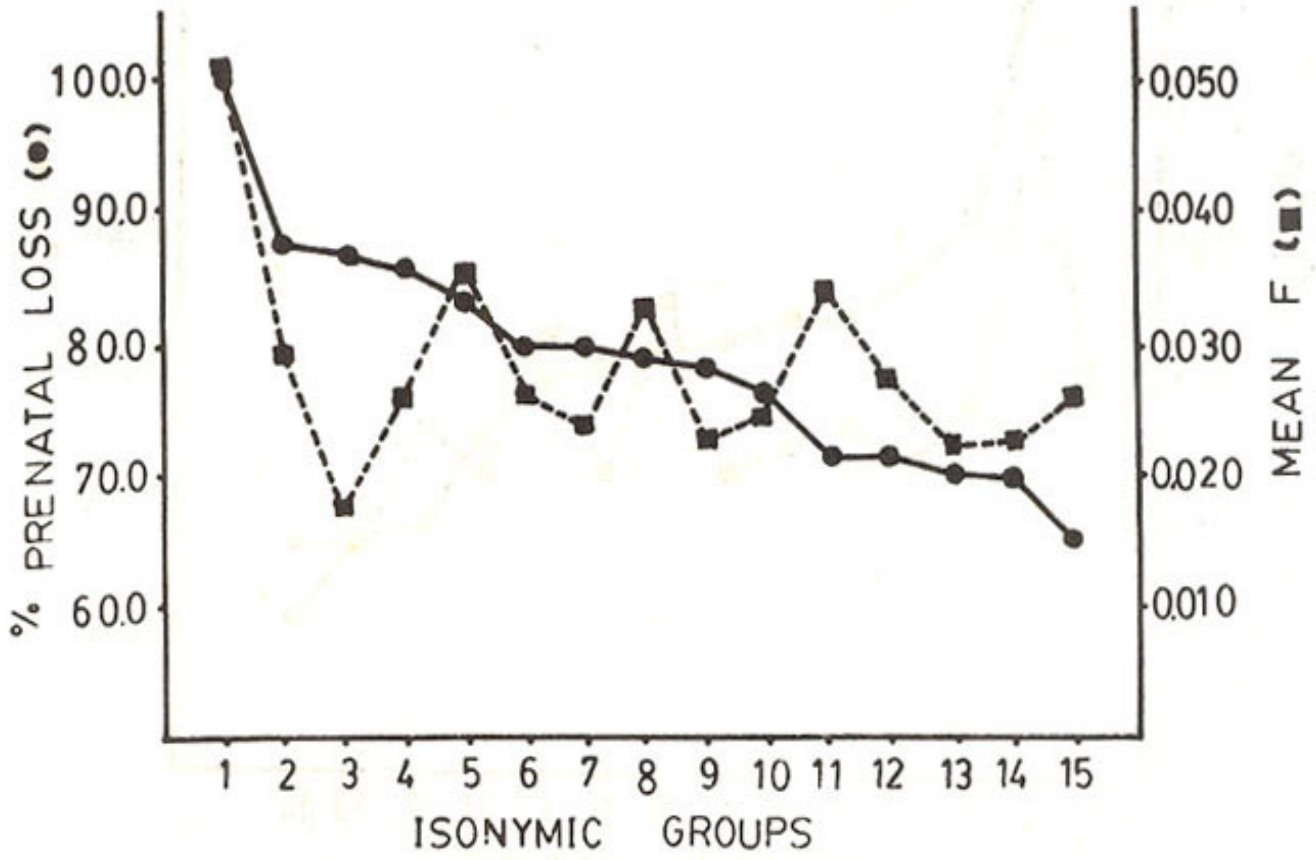
Double second cousin marriages are seen in 66.67% of the families. Among Rajpoots (7.14%), Khans (7.41%), Qureshis (6.90%), Bhattis (6.52%), Khokhars (6.25%) and Awans (5.55%) these type of marriages are quite common.
Second cousin marriages are mostly seen in Khans (7.41%), Qureshis (6.90%), Jats(5.77%) and the Syeds (5.26%). 46.67% of the families indicate these marriages.
There are certain marriages where parents have close blood relations but their exact relationship cannot be established. In other words, they belong to the same isonymic group but the whole relationship is so complicated that it is difficult to trace back the exact ancestry. These type of marriages have been grouped into two classes (a) Bradari distant relations (b) Bradari relations. For practical purposes the spouses in both the categories are considered as not related and coefficient of inbreeding (F) has been assumed zero. Other type of marriages where spouses belong to different isonymic groups and ancestry and show absolutely no blood relations are the true 'unrelated marriages'.
Marriages of Bradari distant relations are common in Mughal (20.00%), Sheikh (15.39%), Rajpoort (12.14%), Awan (11.11%) and Khan family (11.11%).
Higher proportions of marriages within Bradari are seen in the Kakezai (42.86%), Arain (24.78%), Sheikh (23.07%), Awan (22.23%), Bhatti (17.39%) and Jat families (17.31%).
Unrelated type of marriages were common in families like the Butts (40.68%), Syeds (39.47%), Khokhars (37.50%), Maliks (33.33%), Chaudharys (30.00%), Khans (35.18%) and Mughals (30.00%).
Family size, percentage distribution of livebirths, prenatal loss, postnatal loss, total loss, total pregnancies, and mean F values in each isonymic group are given in Table II. Wright's (1922) formula was used for the calculation of mean F. The percentages were calculated by dividing the number in each parental relationship with the total of the row. Due to small sample size all parental relationships, except first cousin and unrelated categories, were combined together.
The highest family size in first cousin marriages was observed in Kakezais (5.20), Qureshis (4.96), and Mughals (4.60) .In unrelated category Awans (4.80), Bhattis (4.23) and Mughals (4.08) families indicate the highest family size. The lowest family size in first cousin and unrelated marriages is seen in Khokhars (2.20), Maliks (2.25), Khans (2.43), and Sheikhs (2.93), Kakezais (3.00), Jats (3.07) respectively.
The isonymic groups, Qureshis (49.08%), Chaudharys (47.82%), and Jats (41.62%) show the highest livebirths in first cousin marriages, while lowest livebirths are seen in the Khokhars (18.33%),Khans(20.00%), and Bhattis(27.23%) families. Among unrelated marriages the highest livebirths were in Syeds (40.32%), Khokhars (40.00%), Awans (38.71%) and the lowest one in Butts (9.33%), Kakezais (12.50%) and Sheikhs (14.91%).
The Malik (75.00%), Khokar (71.43%) and Bhatti family (52.38%) show the highest prenatal loss, while the Mughal (21.74%), Rajpoot (27.46%), and Awan families (28.57%) show the lowest percentage in the first cousin marriages. The 'all related' category indicates the highest prenatal loss in the Khokhar (100.00%), Malik (87.50%), Mughal families (86.96%), and the lowest loss was observed in the Syed (65.12%), Butt (69.70%) and Kakezai families (70.00%). The highest prenatal loss (stillbirths+abortions) in unrelated marriages is seen in Syeds (34.88%), Butts (30.30%), Kakezais (30.30%), and the lowest loss in Maliks (12.50%), Mughals (13.04%) and Awans (14.28%).
The highest postnatal loss in first cousin marriages was observed in Qureshis (61.90%), Maliks (60.00%), Butts (54.54%), and the lowest percentage in Rajpoots(23.07%), Awans (29.51%), Kakezai families (27.27%). Apparently, the highest postnatal loss in first cousins was observed in the Chaudhary family (100%). This value seems to be the result of sampling error. No deaths were recorded in related category and unrelated category in this family. Similarly, postnatal deaths are not

represented in the Khokhar family in first cousin marriages in the present data.
Postnatal deaths in 'all related' category seem to be the highest in Chaudhary and Sheikh families, but in the present data there was no representation of deaths in 'related' and 'unrelated' categories respectively. This could bias the results, hence, this was not considered as the actual highest postnatal loss. The highest postnatal loss was recorded in Kakezais (90.91%), Rajpoots (89.74%), Qureshis (88.10%). The lowest deaths in Khokhars (28.57%) is due to no representation of postnatal deaths in first cousin marriages. Other families showing the lowest postnatal loss are the Mughal (57.17%) and Butt families (59.09%).
The unrelated parental relationships show the highest postnatal loss in Mughals (42.86%), Butts (40.91%), Khans (30.77%), and the lowest in Kakezais (9.09%), Rajpoots (10.26%) and Qureshis (11.90%).
The Maliks (69.23%), Qiireshis (53.42%), Butts (47.27%) show the highest total loss (prenatal+postnatal), and the lowest in Chaud-harys (22.22%), Arains (26.46%) and the Awan family (29.41%) in first cousin relationship. The 'all related' category shows the highest total deaths in Sheikh (89.04%), Qureshi (86.30%), Malik (84.61%) and the lowest in Khokhar (64.29%), Butt (65.45%) and Syed families (66.67%). The unrelated parental relationships show the highest total loss in Mughal (43.32%), Khokhars (35.71%), Butts (34.55%), and the lowest in Sheikhs (10.96%), Qureshis (13.70%) and Maliks (15.38%).
The highest total pregnancies in the first cousin parental relationship are seen in the Qureshis (48.93%), Chaudhary (41.51%) and the Jat families. The 'all related' category shows the highest percentage pregnancies in Sheikhs (84.19%), Kakezais (84.04%) and Qureshis (80.71%). The lowest pregnancies in first cousin are in Khokhars (23.88%), Khans (24.42%) and Awans (27.54%), and in 'all related' relationships Butts (58.85%), Syeds (60.48%) and Awans (63.77%) indicate the lowest pregnancies.
The highest pregnancies in unrelated category are in Butts (41.15%), Syeds (39.52%), Khokhars (38.71%) and the lowest in Sheikhs (15.80%), Kakezais (15.96%) and Qureshis (19.28%).
The isonymic groups given in Table II were arranged in a descending order for prenatal loss in 'all related' parental relationships, starting with the family showing the highest prenatal loss (Fig. 1).

Fig. 1



Percentage prenatal loss (all related) and mean F in various isonymic groups (1. Khokhar, 2. Malik, 3. Mughal, 4. Awan, 5. Qureshi, 6. Rajpoot, 7. Arain, 8. Jat, 9. Khan, 10. Sheikh, 11. Chaudhary, 12. Bhatti, 13. Kakezai, 14. Butt, 15. Syed.).

Simple and partial correlations were carried out to find out relationship between prenatal loss in "all related" category and mean F value in each isonymic group. There is a highly significant partial correlation ($r = -0.7924$, $P<0.001$) between prenatal loss and mean F when all parental relationships, except first cousins and unrelated, were combined together (Table III).

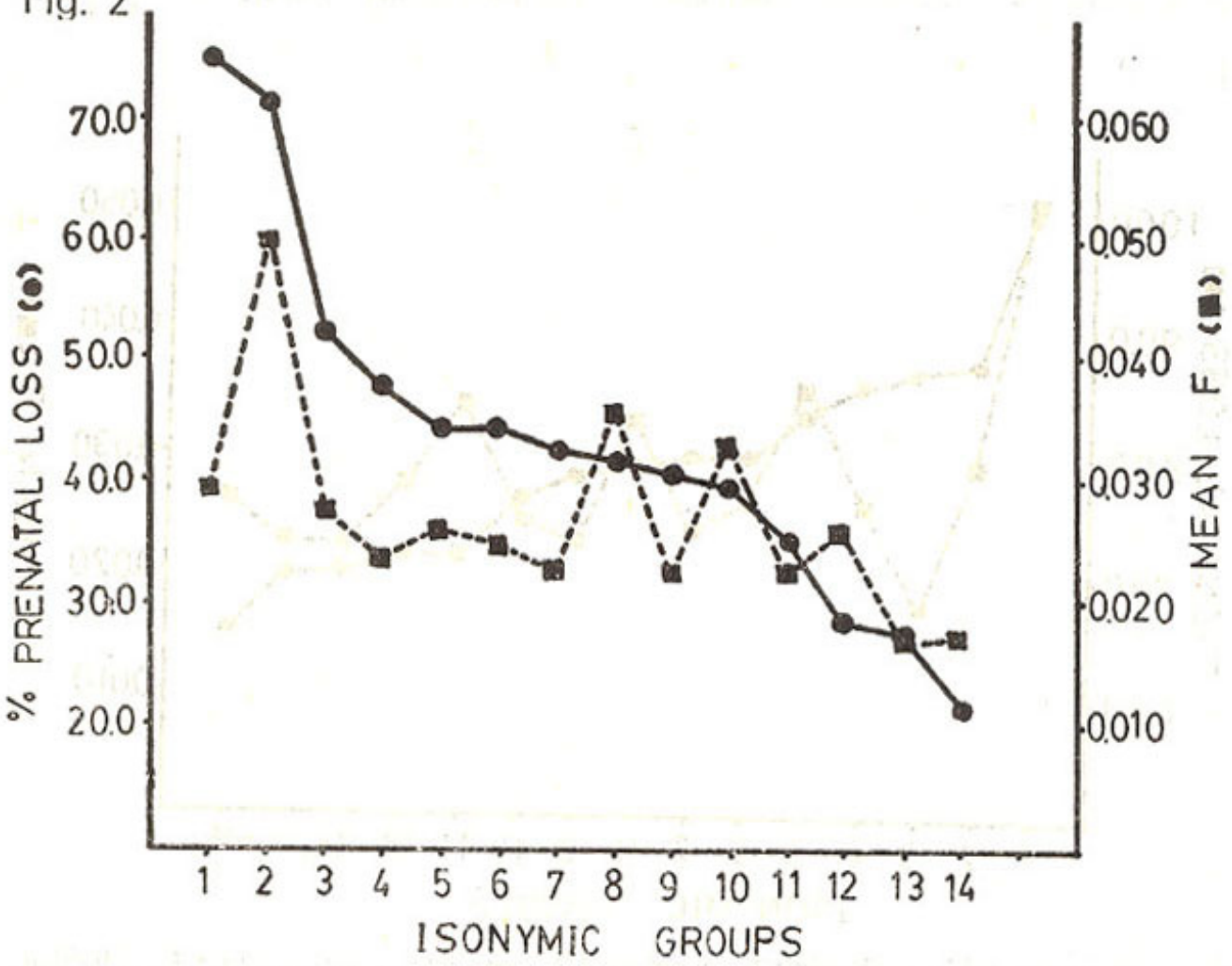
Table III

Simple and Partial Correlations in Relation to Prenatal loss (all related) and Mean F in Different Isonymic Groups.

Factors	*Simple correlation*	*Corrected for*	*Partial correlation*
Family surname and prenatal loss	—0.8964	—	—0.9627
Family surname and mean F	—0.3880	prenatal loss	—0.8268
Prenatal loss and mean F	+0.0241	fomily surname	—0.7924

The data were also arranged in a descending order for prenatal loss in the first cousin relationship. The Chaudhary family showing zero percent prenatal loss was not included in the analysis, since the result could be a sampling error. A statistically significant lack of correlation between first cousin prenatal loss and mean F was observed (partial correla-tion=+0.5959; $P<0.05$; Table IV; Fig. 2).

Fig. 2



Percentage prenatal loss (first cousin) and mean F in various isonymic groups (1. Malik, 2. Khokhar, 3. Bhatti, 4. Arain, 5. Syed, 6. Sheikh, 7. Butt, 8. Qureshi, 9. Khan, 10. Jat, 11. Kakezai, 12. Awan, 13. Rajpoot, 14. Mughal.

Table IV

Simple and Partial Correlations in Relation to Prenatal loss(first cousin) and Mean F in Different Isonymic Groups.

Factors	*Simple correlation*	*Corrected for*	*Partial correlation*
Family surname and prenatal loss	—0.9276	—	—0.9229
Family surname and mean F	—0.4634	prenatal loss	+0.4067
Prenatal loss and mean F	+0.6271	family surname	+0.5959

Discussion

The distribution of various parental relationships in different isonymic groups shows that double first cousin marriages are popular in Jats, , Kakezais, Bhattis, Qureshis, and Butts; first cousin marriages in Jats, Syeds, Qureshis, Sheikhs, Rajpoots, Khokhars, Maliks and Arains; first cousin once removed among Kakezais, Bhattis Qureshis, Sheikhs, Syeds, Rajpoots, Khokhars, Arains; double second cousin in Awans, Bhattis, (Qureshis, Rajpoots, Khokhars, second cousin in Jats, Qureshis and Syeds; bradari distant relations in Awans, Sheikhs, Rajpoots, and Khans, Bradari marriages in Awans, Kakezais, Sheikhs, and Arains; unrelated marriages are popular in Syeds Khokhars, Khans, and Butts. These consanguineous marriages popular in different isonymic groups indicate the highest mean F in Khokhar (0.512), Qureshis (0.0355), and Jats (0.0330).

The effects of higher proportion of consanguineous marriages in families like the Qureshi indicate the highest livebirths, family size, postnatal loss, total loss and pregnancies in the first cousins, but they have the lowest total loss where marriages are between unrelated spouses. Similarly, Maliks show the highest prenatal loss, postnatal loss and total loss in the first cousin marriages and the lowest total loss in unrelated relations. Jats have the highest livebirths and pregnancies in the first cousin parental relationships.

The Khokhars show the lowest livebirths, family size and pregnancies in first cousins, but there is the highest total loss in urelated marriages. The Sheikhs indicate the lowest livebirths, family size and total loss in the unrelated marriages, but the highest pregnancies and total loss in 'all related' parental relationships.

In the unrelated parental relationships Syeds indicate the highest parental loss, pregnanccies and livebirths. Similarly, Butts have the highest prenatal loss, postnatal loss and pregnancies, but the lowest livebirths. Mughals, on the other hand, have the lowest prenatal loss and the highest postnatal loss. They show the highest prenatal loss in the 'all related' category. The higher harmful effects observed in unrelated marriages in Syeds, Butts, and Mughals may be due to their long history of consanguineous marriages.

The present investigation shows the harmful effects observed in the offspring of the parents who themselves are the product of consanguineous marriages. In another study, though not directly related to the present one, Yamaguchi et al f1975) showed in a Japanese population the delayed effects of inbreeding on offspring whose parents were the products of consanguineous marriages. They concluded that there was a significant effect of maternal inbreeding on mortality of children, but no contribution of paternal inbreeding on mortality was observed. They suggested that delayed effect of inbreeding expressed through some 'inferiority' in physical conditions of the mother was due to increased homozygosity. Further, they showed that the effect of maternal inbreeding was more prominent on mortality in the first year than in the first six years of life.

In the present study, the mean F of different isonymic groups shows highly significant correlation with the prenatal loss in 'all related' category (partial correlation= -0.7924; $P<0.001$). It could be concluded that the depth of consanguinity varies in the various isonymic groups, hence varying in order of homozygosity.

The investigation shows that preierred first cousin and close relative marriages in various isonymic groups enhance the fraction of genetic load as expressed in the offspring in terms of prenatal and postnatal deaths and would bring in more morbid effects. The perpetuation of this system of marriages obviously leads to deleterious effects and this practice should be discouraged and possibly abandoned.

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