

SHORT COMMUNICATION

HOMOSEXUALITY AND INBREEDING

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ABSTRACT

Overt homosexuals were interviewed in an attempt to find out if the consanguinity rate of their parents was greater than that of the couples in the general population. We found parental consanguinity in five among 175 male homosexuals and one in 106 homosexual women, the rate of consanguineous individuals (2.2%) did not differ significantly from that of a control sample of 695 university students of both sexes, among whom 2.9% had consanguineous parents. Our data do not conform to the suggestion, made by Kerr and Freire-Maia (*Rev. Brasil. Genet.* 6: 177-180, 1983), that parental consanguinity is greater in male homosexuals than in the general population.

INTRODUCTION

Kerr and Freire-Maia (1983) analyzed the records of interviews conducted by duly instructed medical students with 54 couples selected for having one or more overt homosexual sons. Among them, six were formed by first cousins, one by first cousins once removed and one by second cousins. In a control sample of 54 couples interviewed, no consanguinity was detected. The rate of parental consanguinity found among the male homosexuals was significantly different, at the 0.001 level, from the rate of consanguinity found by Freire-Maia (1957) in Church records, among 9,384 marriages contracted in the diocese of Ribeirão Preto, where the investigation took place.

We thought that these findings deserved confirmation and that a comparison with the case of female homosexuals would be convenient.

SUBJECTS AND METHODS

We contacted owners or well-known customers of male and female gay bars in the city of São Paulo and

explained to them that we were collecting information for a university research project. Most volunteered to introduce us to costumers in the bars. Another group of male homosexuals was interviewed in a clinic for the treatment of ailments of homosexuals.

After a short conversation to ensure that the informer was indeed an overt homosexual, we registered his or her sex and the consanguinity status of his or her parents. The question about consanguinity was repeated with different wordings to avoid misunderstandings. When the answer was positive, the degree of consanguinity was ascertained by drawing up a pedigree.

Some of the male homosexuals were asked if they were accustomed to have sexual relations with men only or with both sexes.

As a control sample, university students in the city of São Paulo were asked to fill a file card with personal information, including the consanguinity of their parents. Those with consanguineous parents would meet individually with the interviewer for drawing up their pedigrees.

For part of each sample the town of birth was registered.

RESULTS

Table I summarizes our results. There are no significant differences in parental consanguinity rates at

the 0.05 level between: the male and the female homosexual samples; the male and the female students samples; the male homosexuals and the male students; the female homosexuals and the female students; the pool of male and female homosexuals and the pooled students samples.

Table I - Parental consanguinity of homosexuals and of students (the control).

Couples	Parents of			
	Homosexuals		Students	
	Male	Female	Male	Female
Number	175	106	194	501
First cousins	5	1	2	11
Second cousins	-	-	1	6

The male homosexuals, compared to the female homosexuals, as well as the pooled homosexual samples, compared to the students sample, did not differ significantly at the 0.05 level, with regard to their distribution according to the size of the towns of birth.

Eighty male homosexuals described themselves as strict homosexuals and 94 as bisexuals.

DISCUSSION

A subsequent extension of the students sample to one thousand informants gave a rate of 1.2% first cousins among their parents (Frota-Pessoa, 1989). Even so, the difference between this rate and the frequency of parents of homosexuals who are first cousins (2.2%, Table I) remains not significant.

Some differences in methodology probably contributed to the discrepancy between Kerr and Freire-Maia (1983) results and ours.

First, they interviewed the parents of homosexuals and controls, while we asked the subjects about their parental consanguinity. Some of our informants might be unaware of the consanguinity existing between their parents, especially if it is remote, making our frequencies underestimate. This, however, would be true also for our control group, making the comparison sound.

Second, their controls were couples matched to the parents of the homosexuals by being their neighbors, while we used information given by students about their parents, who were not geographically matched to the parents of the homosexuals. Their choice is clearly better, although more laborious.

Third, it is believed that homosexuals tend to migrate to bigger towns to escape from the proximity of their families more often than heterosexuals. If this is true, the subjects in our homosexual samples would have parents from smaller towns (where consanguinity is greater) more frequently than the students and this might explain an increase in their consanguinity in comparison to that of the students.

To check on that we registered the birth place of part of the samples and found that the proportion of persons born in large, medium or small towns did not differ significantly at the 0.05 level for the homosexuals (both sexes) compared to the students (Table II). This suggests that the two groups have similar migratory tendencies.

Table II - Distribution of subjects according to size of birth town.

	Homosexuals			Students
	Male	Female	Both	Male + Female
Number	175	64	239	612
Birthplace population:				
Large	55%	67%	58%	63%
Medium	16%	23%	18%	20%
Small	29%	9%	24%	17%

Large - More than 1,000,000 inhabitants.

Medium - 100,000 to 1,000,000 inhabitants.

Small - Less than 100,000 inhabitants.

Modern evidence points towards the influence of genetic and environmental factors in sexual orientation (revision in Hammer *et al.*, 1993; Rish *et al.*, 1993), and Kerr and Freire-Maia (1983) were right in suggesting that "male homosexuality seems to have a genetic component". However, a detectable increase in parental consanguinity for a polymorphic trait would be surprising, on theoretical grounds, even if it was completely genetic in determination.

The prevalence in the population of male homosexuality is considered, in general, as ranging from 4% to 10%, but has been evaluated, with a stringent test, to be 2% (Hammer *et al.*, 1993), a value that we will adopt below. A greater prevalence would make our argument against an increased rate of consanguinity in the parents of homosexuals even stronger.

Under a monogenic recessive hypothesis, which maximizes parental consanguinity, the frequency of the gene responsible for homosexuality would be $q = \sqrt{0.02} = 0.141$, for a prevalence of 2%.

Among the 54 couples with homosexual sons studied by Kerr and Freire-Maia (1983), there were six formed by first cousins, one by first cousins once removed

and one by second cousins. This gives an average inbreeding coefficient of $F = 0.00781$.

The frequency of consanguineous marriages in the general population from which the sample was taken was evaluated by Freire-Maia (1957) as $c = 0.0137$.

Using these data, the frequency of parental consanguinity in the case of homosexuals would be

$$k = c[F + (1-F)q]/[cF(1-q) + q] = 0.0143 \text{ or } 1.43\%.$$

This value is not much different from the one we found empirically (2.2%, Table II), but is about ten times smaller than the one (14.8%) detected by Kerr and Freire-Maia (1983).

Conversely, the gene frequency q could be determined for the presumptive recessive allele determining homosexuality, if a frequency of parental consanguinity $k = 0.148$ is detected in a sample of homosexuals with an average coefficient of inbreeding of $F = 0.00781$, drawn from a population where the frequency of consanguineous marriages is $c = 0.0137$. It would be

$$q = Fc(1-k)/[k(1-c) - c(1-F)(1-k)] = 0.00068.$$

For this gene frequency of about one in a thousand, the corresponding frequency of homozygotes is about one in a million. Using $k = 0.022$, the value found by us, we obtain $q = 0.012$ and a frequency of homozygotes of 0.00014. Although one thousand times greater than the value obtained by starting with $k = 0.148$, this frequency is still too small.

We take this as a demonstration that the monogenic recessive hypothesis is inadequate and that environmental factors are associated with genetic ones in the origin of homosexuality.

This shows that a parental consanguinity rate for homosexuals significantly superior to the one prevailing in the general population is incompatible with a prevalence of homosexuals of 2% or more, under the hypothesis of a recessive monogene; and the incompatibility increases if we assume a polygenic system, with or without an environmental component.

Not even a heterogeneity system, with individual recessive alleles from many loci inducing homosexuality when in homozygosis, would justify a high parental consanguinity coexisting with a phenotypic frequency of 2% or more, since, for that, an extremely large number of alleles (about 20,000) at different loci, with an average frequency of about 0.001, would have to be involved.

On the other hand, if we assume that the rate of parental consanguinity of homosexuals does not surpass that of the general population, the field is open for any of these hypotheses and the opinion of Kerr and Freire-Maia (1983) is vindicated when they suggest "the presence of a predisposing genetic factor in the etiology of male homosexuality" and submit that "a genetic model to explain this component must take into consideration that a recessive mechanism - either a monogenic or polygenic one - is plausible..." We agree with such statements and take exception only to the possibility of a high rate of parental consanguinity in the case of homosexuals.

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RESUMO

Entrevistamos homossexuais assumidos para verificar se a taxa de consangüinidade entre seus pais era maior do que a dos casais da população geral. Encontramos consangüinidade entre os pais de 5 entre 175 homossexuais masculinos (2,9%) e 1 entre 106 mulheres homossexuais (0,9%), perfazendo 2,2%, no conjunto dos dois sexos. Esta taxa não difere significativamente da que encontramos em uma amostra controle de 695 estudantes universitários dos dois sexos, 20 dos quais tinham pais consangüíneos (2,9%). Nossos dados (e um argumento teórico que apresentamos) não confirmam a sugestão feita por Kerr e Freire-Maia (*Rev. Brasil. Genet.* 6: 177-180, 1983) de que a taxa de consangüinidade dos pais dos homossexuais masculinos deve ser mais alta do que a dos casais da população geral.

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