Proc. Indian natn. Sci. Acad. **B49** No. 5 pp 407–411 (1983)

Consanguinity Effects on Intelligence Quotient and Neonatal Behaviours of nsari Muslim Children

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(Received 28 March 1983)

Effects of parental consanguinity ($F = 0.0625$) on the cognitive and social behaviour of children have been studied among the Ansari muslims of Bhagalpur, Bihar. IQ of inbred children (8–12 years old) is found to be lower (69 in rural and 79 in sub-urban populations) than that of the outbred ones (79 and 95 respectively). The onset of various social profiles like visual fixation, social smile, sound seizures, oral expression and hand-grasping are significantly delayed among the newly-born inbred babies.

Key Words : Consanguinity effects, Intelligence quotient, Neonatal behaviour

Introduction

Marriage between spouses having at least one common ancestor is said to be consanguineous, and the offsprings from such marriages are called as inbred ones. Inbreeding in human populations is reported to cause loss of foetus and/or increase in the incidence of post and paranatal deaths (Basu 1975, Ansari & Sinha 1978). This deterioration in the reproductive fitness of the population is mainly due to homozygosis of the deleterious alleles present in its gene pool (Jones 1924). As the various traits of human behaviour are controlled by the genetic system (Freedman 1965, Lindzey et al. 1971, Singer & Singer 1972), and more so in and near the operational environment of the middle-class socio-economic status (Bodmer & Cavali-Sforza 1970), it is quite logical to think that some deterioration in these traits might be occurring in the populations which practise consanguinity. The present work, therefore, was aimed to know the effects of consanguinity on a few of the cognitive and social behaviours.

Materials and Methods

The Ansari muslim population residing in the sub-urban (Nathnagar and Champanagar) and rural (Narga, Sahibganj and Chowki-Niyamatpur) localities of Bhagalpur (Bihar) was selected for this study. It is an endogamous population of middle-class socio-economic status. Nearly 40% of marriages among them are

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consanguineous in nature, and that between the first cousins ($F = 0.0625$) is most common (about 30% alone). Consanguinity is supposed to be practised by this population since their embrace of Islam, that is, for the last 8 to 10 generations.

Data were collected during personal contacts with the subjects as per methods described below:

Cognitive Behaviour

It consists of Intelligence, which is defined as the innate general capacity of an individual to learn something. This behaviour is measured by Intelligence Quotient (IQ), and it has a polygenic inheritance. IQ tests were performed among school-going boys and girls of age 10 to 12 years. Parents of such children belonged to the age-group of 30–35 years at the time of latter's birth, and (as shown by their average skill in works) possess normal intelligence. The test-system used was Weschler's Children Scale (Revised 1974), which includes five verbal (information, similarities, arithmetic, vocabulary, comprehension) and five performance (picture completion, picture arrangement, block-design, object assembly, coding) tests. The average reliability co-efficients for the different sub-tests (in terms of scores) vary from 0.77 to 0.86 for the verbal, and from 0.70 to 0.85 for the performance tests. The reliability for full-scale IQ is 0.96. The standard error of measurement for verbal, performance and full-scale IQs are 3.60, 4.66 and 3.19 respectively. Such reliability and variability values (as worked out by the author of the test-system) make this test most suitable for measuring the IQ of children belonging to age-group of 8 to 14 years. The tests were performed as per guidelines therefore, and scoring was done accordingly.

Social Behaviour

This was observed among newly born (neonates) babies. A detailed questionnaire incorporating the address, the types of consanguinity, date of birth of the child, and its age (in days) on the day of the onset in it of various social behaviours like visual fixation, social smile, sound seizure, oral expression and hand-grasping was prepared. Such questionnaires were handed over to mothers having full-term pregnancy. After receiving the information (from parents) of the child's birth, weekly and fortnightly visits to them were made to note the onset of above mentioned features in them. The children belonging only to the first and the second parity orders were considered. Those who got seriously sick or got separated from their mothers were not considered.

The sample selected for present survey consisted of children born from first-cousin marriages ($F = 0.0625$). Number of children from marriages involving the remaining degrees of consanguinity were not considered owing to their small number. Children born from non-consanguineous marriages were surveyed to facilitate the comparison. Only one child per house-hold was taken in survey.

Results

The frequency distributions of IQ values among children born from both consanguineous and non-consanguineous marriages are found to be of normal type. The mean IQ of inbred children from both rural (69.2 ± 0.9) and sub-urban (78.6 ± 1.0) areas is significantly

lower (at 0.05 level) than that of the non-consanguineous ones (78.5±0.9 and 93.0±1.1 respectively, table 1). No significant difference is found between the IQ of boys and girls within any population.

The populations living in the sub-urban areas are found to have higher IQ than that of their corresponding rural populations, which is but expected because behavioural performances have been reported to be induced to increase upon exposure of the organism to an experienced and enriched environment (Shashoua 1965, Hyden 1967).

Relevant data concerning neonatal social behaviour could be collected from the sub-urban population only, which included the information about the children born during June 1981 to May 1982. The rural population could not co-operate due to various taboos in presenting their newly born babies to strangers (the authors). The data (table 2) suggest significant delays in the onset of all the six traits among the

Table 1 *IQ among children (age-group 8-12 years) born from consanguineous (F=0.0625) and non-consanguineous marriages*

Population	Parameters	Non-consanguineous Ansari	Consanguineous Ansari
RURAL	Sample size	358	266
	IQ mean ($\bar{X}$±S E)	78.5±0.9	69.2±0.9*
	SD	16.96	13.78
	Range	40–120	40–100
	Mode	75	65
	Median	80	70
	IQ in boys ($\bar{X}$±S E)	79.1±1.2 (n=184)	69.3±1.2 (n=139)*
	IQ in girls ($\bar{X}$±S E)	77.8±1.3 (n=174)	69.0±1.3 (n=127)*
SUBURBAN	Sample size	390	300
	IQ mean ($\bar{X}$±S E)	93.0±1.1	78.6±1.0*
	SD	21.08	16.45
	Range	40–140	40–120
	Mode	95	75
	Median	95	80
	IQ in boys	92.9±1.4 (n=220)	78.80±1.4 (n=155)*
	IQ in girls	91.1±1.6 (n=170)	78.3±1.4 (n=145)*

*indicates significant (at 5% level) decrease from the corresponding value in the non-consanguineous population
SD, standard deviation; *SE*, standard error

Table 2 *The age (in days) of Ansari neonates at the onset of various behavioural traits in them*

Behaviour	Marriage type of parents						*Diff. between the means of the populations
	Non-consanguineous (n=184)			Consanguineous (n=152)			
	Range	$\bar{X}$ ± S E	SD	Range	$\bar{X}$ ± SE	S D	
Visual Fixation	23–55	40.9±0.5	6.2	31–59	44.2±0.5	6.2	4.7
Social Smile	50–94	71.8±0.8	10.3	55–99	77.2±0.8	10.3	4.8
Sound Seizure	100–144	122.3±0.8	10.3	105–149	127.2±0.8	10.3	4.2
Oral Expression	70–114	92.1±0.8	10.3	75–119	96.7±0.8	10.3	4.1
Hand Grasping	110–200	154.6±1.5	20.6	120–209	165.6±1.7	20.5	4.9

*indicates significant difference at 0.05 level
SD, standard deviation; *SE*, standard error

Ansari neonates born out of consanguineous marriages.

Discussion

The results thus show that the consanguinity adversely affects the intelligence and the onset of a few social behavioural traits among inbred children and the neonates respectively. The reason for the appearance of these undesirable effects of consanguinity is simple to understand. Behaviours, whether cognitive or social, are as said earlier, under the control of the genotype of the organism, and the concerned genes are polygenic in nature. These genes are reported to be unique sequences of DNA, which very often transcribe m-RNA in nerve cells only (Hyden 1967). The recessive alleles of these polygenes produce detrimental effects. In an outbred population, these recessive alleles most often remain in heterozygous condition, but among the inbred ones, their homozygosis occurs, and deterioration of the population is the natural result. Decrease in IQ among children born from consanguineous marriages have also been reported by a few other workers (Cohen et al. 1963, Schull & Neel 1972, Bashi 1977) in certain Japanese and South-American populations.

If consanguinity is practised for many generations (thus establishing inbred lines), the recessive detrimental alleles are quite likely to get considerably eliminated from the gene-pool of the population, and then a situation can be foreseen when consanguinity would fail to cause any marked inferiority (as in the case of South-Indian Hindu populations; Rao et al. 1977, 1979a, b, 1980). Such situation among Ansari muslims of Bhagalpur, however, does not appear to occur, as their marriage-structure shows only 40% of consanguinity, and no establishment of inbred lines. Ansari muslims may, therefore, be suggested to stop practising consanguinity.

Acknowledgements

Financial assistance to the authors by the Council of Scientific and Industrial Research, New Delhi (Grant No. 38 (361)/80/EMR-II) is thankfully acknowledged.

References

Ansari N A and Sinha S P 1978 Survey on the effects of inbreeding in two populations of Bihar; *Indian J. Med. Res.* **68** 295–305

Bashi J 1977 Effects of inbreeding on cognitive performance; *Nature* **266** 440–441

Basu S K 1975 Effects of consanguinity among north-Indian muslims; *J. Pop. Res.* **2** 57–68

Bodmer W F and Cavali-Sforza L L 1970 Intelligence and race; *Sci. Amer.* **223** 19–26

Cohen T, Block N, Flum Y, Kadar M and Goldschmidt E 1963 in: *The Genetics of Migrant and Isolate Populations* eds. E Goldschmidt (Baltimore: Williams and Wilkins)

Freedman D 1965 An ethological approach to the genetical study of human behaviour; in *Methods and Goals in Human Behaviour Genetics* ed S G Vandenberg A P N Y, 141–157

Hyden H 1967 Behaviour, neural function and RNA; *Progr. Nucl. Acid Res. Mol. Biol.* **6** 187–192

Jones D F 1924 The attainment of homozygosity in inbred strains of maize; *Genetics* **9** 405–418

Lindzey G, Loehlin J, Manosevitz M, and Thiessen T 1971 Behavioral Genetics; *Ann. Rev. Psych.* **22** 39–52

Rao P S S and Inbaraj S G 1977 Inbreeding effects on human reproduction in Tamilnadu of South India; *Ann. Hum. Genet.* **41** 87–98

——1979 Inbreeding effects on fertility and mortality in Southern India; *J. Med. Gen.* **16** 24–31

——1979 Trends in human reproductive wastage in relation to long-term practice of inbreeding; *Ann. Hum. Genet.* **42** 401–413

——1980 Inbreeding effects on foetal growth and development; *J. Med. Gen.* **17** 27–33

Schull W J and Neel J V 1972 The effects of parental consanguinity and inbreeding in Hirado, Japan. V. Summary and interpretation; *Am. J. Hum. Genet.* **24** 425–453

Shashoua V E 1965 RNA metabolism in goldfish brain during acquisition of new behavioral patterns; *Proc. nat. Acad. Sci. U.S.A.*, **62** 160–165

Singer J L and Singer D G 1972 Personality; *Ann. Rev. Psych.* **23** 375–393