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Incidences of ABO and Rh(D) Incompatibilities among the Meiteis of Kwatha Village Manipur, India

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ABSTRACT Incidences of ABO and Rh (D) incompatibabilities of the couples has been investigated among the Meiteis of Kwatha village, Manipur in north –east India. Out of 42 couples, only 12 are found to be incompatible of the ABO system. It is noteworthy that none of the couples and their offsprings are found to be Rh (D) -ve. Prenatal death due to ABO incompatibility is higher among the incompatibles (5 %) than the compatibles (2 %). In terms of living children, the trend is reversed, i.e., higher frequencies of living children are observed among the compatibles (84.84%) than the incompatibles (75 %).Segregation distortion of blood group alleles due to foeto-maternal incompatibility could also not be established in the male and female children.

INTRODUCTION

The human blood groups have been studied extensively for their involvement in incompatibility selection. Various studies on ABO incompatibility (Matsunaga and Itoh, 1958; Takano and Miller, 1972; Banerjee, 1980; Srikumari et al., 1987) have produced evidences of high frequency of prenatal death among incompatible matings. Levine (1943, 1958) showed that in ABO incompatible matings, apart from Rh (D) discor-dance led to abortion, miscarriage and haemolytic disease. A connection between incompatibility and primary infertility although not clearly established has been suggested attributing the probable reason to presence of antispermatozoa antibody in the uterus of incompatible female (Nag and Banerjee, 1976). Distortion of segregation ratio of blood groups and deviation of secondary sex ratio from expectation among the children have also been investigated by many workers in a way to supplement the evidence of incompatibility selection in utero (Waterhouse and Hogben, 1947; Johnstone, 1954; Matsunaga and Itoh, 1958; Banerjee et al., (1963, 1994).

The present study examines the incidence of incompatible matings in respect of ABO and Rh(D) blood group systems among the Meiteis of Kwatha village, Manipur in north –east India. The Kwatha Meitei is a very small population inhabiting in a remote hilly region near the Indo-Myanmar border in Chandel district of Manipur state. This population is regarded as an offshoot of the large Meitei community, and its settlement in the region dates back to sometime during the reign of the Meitei King Kyamba (c.1467 to 1508 A.D.). The population of the village during April 1997 was only 228 souls comprising 116 males and 112 females. The Kwatha Meiteis, by and large, marry among themselves and intermarriage with the larger Meitei community of the valley is extremely rare, perhaps due to their geographical isolation.

MATERIALS AND METHODS

The data for the present study were collected during April 1997 to January 1998. A few individuals were reluctant to the blood test and as such only 42 couples (out of 46) and their offsprings have been presented here for ABO and Rh (D) incompatibilities. Blood group examination was done on the spot following the direct slide method technique using anti-A, B and anti - D obtained from AVON laboratories, Calcutta. Information on prenatal deaths, medical care and sex of the children have been recorded.

RESULTS AND DISCUSSION

It is noteworthy that none of the couples as well as their offsprings is found to be to be R h(D)-ve.Thus all the incompatibles are of ABO system only. It is also clear from Table1 that many couples of this village are still very young and likely to have more number of children in future.

Incidence of ABO group compatibility and incompatibility among the couples, sexwise children's blood groups and information on prenatal and postnatal child loss are presented in

Table 1: Age range of the couples among the Meiteis of Kwatha village, Manipur.

Compatible couples			*Incompatible couples*		
Range (yr)	*No.*	*%*	*Range (yr)*	*No.*	*%*
15-19	1	3.33	20-24	4	33.33
20-24	7	23.33	25-29	1	8..33
25-29	10	33.33	30-34	1	8..33
30-34	3	10	35-39	3	25.00
35-39	2	6.67	40-44	-	-
40-44	3	10	45-4	1	8..33
45-49	2	6.67	50-54	1	8..33
50-55	2	6.67	55-60	1	8.33
Total	30	100.00	Total	12	99.98

Tables 2a, 2b and 2c. Out of the 42 couples examined in the present study, 30 are found compatible and 12 incompatible. The compatible couples consist of 14 homogamous matings and 16 heterogamous matings. Number of living children born to them ranges from nil to 7 with an average of 2.8 children per couple. Number of pregnancies ranges from nil to 10 giving an average of 3.3 per mother.

Homogamous matings of O parents produce only O children as no other blood group is possible from such a mating. It can be noted that there is a case of still birth in one such parental combination. The cause of still birth is not known but is in no way related to foeto-maternal incompatibility. The one and only case of homogamous mating of A parents produces A children only. Of the three cases of homogamous matings of B group, the first couple produces only B children while the third couple produces

Table 2a: ABO compatible parents and their offsprings among the Meiteis of Kwatha Village (M=Male, F=Female).

Parents	*Offspring*									
Mother X Father	*1st*	*2nd*	*3rd*	*4th*	*5th*	*6th*	*7th*	*8th*	*9th*	*10th*
OXO	O(F)	O(F)								
OXO	O(M)	O(M)								
OXO	O(M)	O(F)	O(F)	O(F)						
OXO	*M(1d)	O(M)	O(F)	O(F)	O(F)	O(F)	*M(3y)	O(F)	O(M)	*F(3m)
OXO	O(M)									
OXO	O(M)	O(M)	O(F)	O(F)	O(F)					
OXO	O(M	*M(6y)	O(M)	O(F)						
OX0	O(F)	O(M)								
OXO	*M(SB)	O(F)								
OXO	O(M)									
AXA	A(M)	A(M)	A(M)	A(F)						
BXB	B(F)	B(F)	*M(10m)	B(M)	B(M)	B(M)				
BXB	F(?)									
BXB	O(F)	F(?)								
AXO	A(F)	A(M)	F(?)	F(?)	F(?)	F(?)	A(M)			
AXO	A(F)	O(M)	*M(3m)	O(F)	M(?)					
AXO	O(M)	*F(13y)	A(F)	O(F)	*M(2y)	*F(1y)	A(M)	O(M)		
AXO	O(M)	F(?)								
AXO	A(F)	FL(3m)								
AXO	A(M)	O(F)								
BXO	O(F)	F(?)	*M(9m)							
BXO	B(F)	*F(8d)	O(M)	B(M)	O(F)					
BXO	-									
BXO	B(M)									
BXO	B(M)	O(M)	F(?)	O(F)	*M(1y)	B(M)	B(F)			
BXO	B(M)	M(?)								
BXO	O(F)	O(M)	*F(9d)							
BXO	O(M)	B(M)								
ABXO	B(M)	A(M)								
ABXA	B(M)	A(F)								

*M(1d)=Male died on the first day
*M(3y)=Male died at 3 years
* F(3m)=Female died at 3months
* F(?)=Female untested
* Male(3m)=Male died at 3 months
* M(?)=Male untested
*M(6y)=Male died at 6 years
*M(SB)=Male still birth
*M(10m)=Male died at 10 months
*F(2y)=Female died at 2 years
*F(1y)= Female died at1year
*F(13y)= Female died at13years

two children, one of whom belongs to O type which reveals the heterozygous genotype of the parents. The second couple of B ♀ × B♂ mating has a small baby girl whose blood group could not be tested. Almost all the six matings of A wife and O husband give birth to both A and O blood group children. It is, therefore, understood that A group mothers are mostly heterozygous, i.e. AO genotype. Genotype of two such A group mothers cannot be recognised due to incomplete

Table 2b: ABO incompatible parents and their offsprings among the Meiteis of Kwatha Vilage (M=Male,F=Female).

Parents	*Offspring*					
Mother X Father	*1st*	*2nd*	*3rd*	*4th*	*5th*	*6th*
O X A	*F (SB)	O (M)	O(M)	A(M)	*FL(2m)	O(F)
O X A	O(M)	A (F)	A(M)			
O X A	O(M)					
O X B	——					
A X B	B(M.5y)	AB(F)	A(F)			
A X B	F(?)					
A X B	*F(1d)	F(8y)	AB(F)	B(M)	A(M)	
A X B	O(F)	O(F)	B(M)	A(F)	AB(M)	
B X A	*M(5y)	A(M)	A(M)	AB(F)	B(M)	
B X A	*F(8d)	B(M)	*F(5y)	F(?)	*M(3y)	*M(2m)
B X A	*F (?)					
A X AB	A (M)	B(F)	AB(M)	B(F)		

*F(SB)=Female still birth
*FL(2m)=Foetal loss at 2 months
*B(M5y)=Male of blood group B died at 5 years
*F(1d)=Female died on the first day
*F(?)=Female untested
*M(5y)=Male died at the age of 5 years
*F(8d)=Female died on the 8 th day
*M(3y)=Male died at 3 years
*M(2m)=Male died at 2 months

Table 2c: Frequencies of mating types and their children in respect of ABO blood groups

Matings					*Blood groups of children*					
♀	*X*	♂	*F*	*Sex*	*A*	*B*	*O*	*AB*	*Unknown*	*Total*
Compatible Matings										
O	X	O	10	M	-	-	12	-	-	12
				F	-	-	16	-	-	16
A	X	A	1	M	3	-	-	-	-	3
				F	1	-	-	-	-	1
B	X	B	3	M	-	3	-	-	-	3
				F	-	2	1	-	2	5
A	X	O	6	M	4	-	4	-	1	9
				F	4	-	3	-	5	12
B	X	O	8	M	-	6	4	-	1	11
				F	-	2	4	-	2	8
AB	X	O	1	M	1	1	-	-	-	2
				F	-	-	-	-	-	-
AB	X	A	1	M	-	1	-	-	-	1
				F	1	-	-	-	-	1
Total			30		14	15	44		11	84
Incompatible Matings										
O	X	A	3	M	2	-	4	-	-	6
				F	1	-	1	-	-	2
O	X	B	1	M	-	-	-	-	-	-
					F	-	-	-	-	-
-										
A	X	B	4	M	1	2	-	1	-	4
				F	2	-	2	2	1	7
B	X	A	3	M	2	2	-	-	-	4
				F	-	-	-	1	2	3
A	X	AB	1	M	1	-	-	1	-	2
				F	-	2	-	-	-	2
Total			12		9	6	7	5	3	30
Grand Total			42		23	21	51	5	14	114

Table 3: Mother-child combination of ABO blood groups among the Meiteis of Kwatha village

Mother	x	Child	Frequencies of children			% of male
			Male	Female	Total	
Compatibles Matings						
A	X	A	9	7	16	60.00
A	X	O	4	5	9	44.00
B	X	B	11	4	15	73.33
B	X	O	4	5	9	44.44
O	X	O	16	17	33	44.48
AB	X	A	1	1	2	50.00
AB	X	B	2	–	2	100.00
Total			47	39	86	54.65 (86.00%)
Incompatible Matings						
A	X	AB	2	2	4	50.00
A	X	B	2	2	4	50.00
B	X	A	22	0	2	100.00
IO	X	A	2	1	3	66.67
B	X	AB	-	1	1	-
Total			8	6	14	57.14
Grand Total			55	45	100%	55.00

data of the children, many of whom refrained themselves from blood grouping test. Moreover, chance may simply produce children of only one blood type, either O or A in the mating of AO genotype mother and O father. Similar picture is seen among the 8 matings of B wife and O husband.Almost all of them (B♀× O♂) give birth to both B and O blood group children indicating the heterozygous (BO) genotype of the B mothers. One of such couples (B♀ × O♂)was recently married and therefore, yet to have a child. The last two compatible matings comprise a case of AB wife and O husband and the other AB wife and A husband. The first couple of AB ♀ and O ♂ produces both B and A children which needs no explanation. The latter couple of AB ♀ and A B♂, who also produces B and A children reveals the heterozygosity of the father. Total number of children born to 30 compatible couples is 99 including 2 prenatal deaths, 3 neo-natal deaths and 10 post natal deaths (Table 4).

With regard to the sex of the children, the couple combinations of O ♀× O ♂, B ♀× B ♂ and A ♀ × O ♂ favour female sex. The couple combination of AB ♀× A ♂ produces children with equal number of males and females. Favour of the male sex is seen in the matings of B ♀× O ♂, A ♀× A ♂ and AB ♀×O ♂. Total number of living children among the compatibles is 84, 41 boys and 43 girls.

Table 2b displays that number of children born to 12 incompatible couples ranges from nil to six giving an average of 2.5 per couple and the average number of pregnancies per mother is 3.33. There is a case of still birth in the first issue of a parental combination of O♀ × A♂, and again foetal loss at 2 months of the fifth pregnancy of the same couple. Blood groups of the still born baby and that of the aborted foetus are not known. Thus nothing could be said regarding the consequence of foeto-maternal incompatibility or erythroblastosis foetalis. It may, however, be noted that three of the living children of this couple belong to blood group O and the one just before the foetal loss at the fifth pregnancy, is blood group A. That sensitization for production of antibody A to the mother might have taken place due to entry of blood group A at the time of parturition of the fourth son whose blood group is A. If it were happened so, then the blood group of that aborted foetus must be A. In the second case of couple combination of O wife and A husband, the first son is blood group O and the following two children are A blood group. Any symptom of foetal loss due to incompatible couple combination has not been reported in this case. The third couple of O ♀× A ♂ has only one child of blood group O. It is, therefore, learned that all these A blood group husbands of O wives are heterozygous (AO). The only case of O♀ × B♂ mating produces no child even after six years of their married life. A death case of a male child at the age of 5 years reportedly from typhoid has been encountered in a parental combination of A ♀× B ♂. The child died after examination of his blood type and it was B. A case of an infant death on the day of its birth and another case of child death at the age of 8 years (female) have been reported by a couple of A♀× B♂. The latter death was also reportedly, from typhoid. Another couple of the same blood group combination produces five living children belonging to all the four possible blood groups A, B, AB and O. Different blood groups of the children born to incompatible parents of A ♀ × B♂ reveal that these parents are heterozygous at ABO locus. Of the three cases of B ♀ ×A♂ matings, the first one has five children, one of them died at the age of 5 years. The cause of death was again reported to be typhoid.The remaining four living children belong to blood groups A, AB and B. The second couple produces six children of which only two

are living. The four deaths include a female infant who died on the 8th day in the first order due to convulsion, a girl in the 3rd order at the age of 5 years due to typhoid, a boy in the 5th birth order at the age of 3 years and lastly an infant (male) who died 2 months after birth. The cause of death of the last 2 children were reportedly diarrhoea. The last incompatible couple of A♀ × A B ♂ mating produces four children of A, B and AB blood groups without a single case o f foetal loss.

Total number of children produced by incompatible couples is 30, comprising 16 males and 14 females. When the sex of the children born to different incompatible matings are examined, it is found that O♀×A ♂ and B♀×A ♂ matings favour male sex and A♀ × B ♂ favour females. The one and only mating of A♀ × A B♂ produces equal number of males and females.

The total number of children born to compatible and incompatible parents together is 114, 57 males and 57 females. Compatible and incompatible mother-child combinations of ABO blood group system are displayed in Table 3. It may be recapitulated that out of the existing 114 children at the time of investigation, 100 were examined for ABO and Rh (D) blood groups.The children, shown in Table 3 are only the tested ones. No Rh (D) negative was found. Hence Rh (D) incompatibility is out of question. It appears from the table that 86% of the children are compatible to their mothers and 14% incompatible. It is learned that nearly 50% of the children born to incompatible couple combinations are compatible to their mothers.

Table 4 exhibits comparative figures on reproductive performance of the compatible and incompatible wives. The number of compatible couples is 30 and that of the incompatible 12.The total number of pregnancies among the compatibles is 99 with an average of 3.3 per mother and the number of pregnancies among the incompatibles is 40 with an average of 3.33 per mother. That means average pregnancy is very narrowly more among the incompatible wives. However, the survival rate of children is higher among the compatibles (84.84%) than the incompatibles (75%).The number of living children per couple is therefore more among the compatible couples (2.8) than the incompatible couples (2.5). Prenatal, neonatal and postnatal deaths are comparatively more among the incompatible wives, the respective values being 5 %, 5 % and 15 %. These values among the compatible wives are 2.02%, 3.03% and 10.10% respectively. The total number of pregnancy wastage and child loss among the compatible wives is 15 (15.15%) and that of the incompatible wives is 10 (25%). It is thus evident that the reproductive performance, by and large, is better among the compatible wives.

Table 4: Reproductive performance and foetal wastage by mating status of the couple.

Reproductive performance and foetal wastage	*ABO*	
	Compatible matings	*Incompatible matings*
No. of couples	30	12
No. of pregnancies	99	40
Pregnancy per couple	3.3	3.33
Living children	84 (84.84)	30 (75)
Living children per mother	2.8	2.5
Prenatal death	2 (2.02)	2(5)
Neonatal death	3 (3.03)	2(5)
Postnatal death	10 (10.10)	6(15)
Total pregnancy wastage and child loss	15 (15.15)	10 (25)

Figures in parentheses are percentages.

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