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ORIGINAL ARTICLE

ABO BLOOD GROUP AND REPRODUCTIVE PERFORMANCE AMONG THE MEITEIS OF CACHAR DISTRICT OF ASSAM, INDIA

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Abstract:

Present paper is an effort to see the fertility performance with reference to ABO incompatibility among 103 Meitei fertile couples of three villages namely Dakshin Mohanpur-V, Sundari-IV and Saint Katherine village of Cachar district, Assam. The data have been collected by household census followed by interview method. ABO blood grouping of the couples have been done by open slide technique using antisera, anti-A and anti-B. The findings of the present study reveals that though there is no significant difference between compatible and incompatible couples but mean conception (3.13), live birth (2.93) and pregnancy wastage (0.15) are less among the incompatible couples. Average incidence of spontaneous abortion is also found to be less (0.04) among the incompatibles but mean still birth (0.11) is marginally high among the incompatibles. AB incompatibles are having higher mean conceptions (3.50) and live births (3.25) among all the incompatible groups (A, B and AB incompatibles). But incidence of still births and spontaneous abortions are more among the B incompatibles. Mean pregnancy (8.00), live birth (7.0) and still birth (2.00) is found to be high in A (wife) and AB (husband) blood group combination but average spontaneous abortion is more (0.27) in O (wife) and O (husband) blend.

KEYWORDS-

Compatible, incompatible, conception, live birth, still birth, spontaneous abortion, etc.

INTRODUCTION

In 1900 Karl Landsteiner identified the ABO blood group system after reporting series of tests (Nazarabadi et al., 2012). ABO system is divided into four major groups known as A, B, AB and O on the basis of presence or absence of antigens and antibodies. Apart from the importance of ABO blood groups in blood transfusion, the ABO blood group system has been associated with incompatibility selection (Ganitha et al., 2012). ABO compatible mating are those where mother carries the dominant blood factor or it is identical with father but in case of incompatible mating the dominant blood factor is absent in the mother which is present in the father. Therefore in ABO blood groups phenotypic combinations such as O (wife) and A or B or AB (husband), A (wife) and B or AB (husband), B (wife) and A or AB (husband) are known as incompatible. Several studies on ABO incompatibility (Banerjee, 1980; Srikumari et al., 1987) have produced evidences of high reproductive wastage in incompatible matings. Levine (1943) showed that apart from Rh (D) incompatibility, ABO incompatibility also led to fetal wastage and haemolytic disease of the newborn due to which it has been studied extensively.

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OBJECTIVE OF THE STUDY

The main objectives of the present study are

1. To see the pregnancy and live birth in relation to ABO blood group of fertile Meitei couples of Cachar district of Assam.
2. To see the role of ABO incompatibility on reproductive wastage especially spontaneous abortion among the Meitei couples.

SIGNIFICANCE OF THE STUDY

Present study deals with the interaction of ABO blood group and reproductive performance of Meitei community of a rural environment. Most of the studies that deal with ABO incompatibility and pregnancy wastage are based on either hospital based samples or the samples where prior information on recurrent spontaneous abortions are known (Takano and Miller, 1972; Bottini et al., 2001; Malekasgar, 2004; Bandyopadhyay et al., 2011). So, it is an effort to acquire information about the affect of ABO incompatibility on the fertility performance of rural based Meitei couples of three villages of Cachar district of Assam.

SCOPE OF THE STUDY

In the performance of a woman biological or physiological factors play a very prime role. It is an established fact that fetal loss and hemolytic disease of the newborn may result from ABO incompatibility (Levine, 1958; Cohen, 1970). Though there are biological restrictions for human reproduction but a number of social, cultural, and psychological factors also influence the levels of fertility in every society (Raj, 2005). Reproductive wastage also influences the overall fertility performance of couples (Sharma and Kapoor, 2004). So an attempt has been made to analyze and interpret the reproductive performance of fertile Meitei couples of three villages of Assam, India.

LIMITATIONS OF THE STUDY

1.Present study may not be an extensive one due to some restrictions which are beyond the researchers' control.
2.Large samples could not be covered due to time limits.
3.The Statistical analysis done for the data may suffer certain limitations.

MATERIALS AND METHODOLOGY

The present study has been carried among the Meiteis of three villages namely Dakshin Mohanpur Part-V and Sundari Part—IV of Sonai Block and Saint Katherine village of Palonghat Block of Cachar District, Assam. Cachar district is one of the largest districts, located on the southern part of Assam. There are different endogamous ethnic communities inhabiting in the district such as Bengali, Meitei, Brishnupriya, Dimasa Kachari, Hmar, Khasi, etc. Linguistically the Meiteis belong to the Tibeto-Burman ethnic group of Mongoloid racial stock (Basu et al., 2005). They belong to Hinduism and follow the patriarchal system of family structure. Marriage by negotiation is the prevailing practice among them. Agriculture is their mainstay of livelihood.

The data have been collected by following household census method in the Meitei households of above mentioned three villages of Cachar District of Assam. After household census 103 willing couples have been identified who were ready to give information on fertility performance as well as ABO blood grouping test. Fertility performances have been recorded through interview method from the above mentioned 103 ever married Meitei women who have at least one live birth. ABO blood grouping of these informed consent couples have been done on the spot by following open slide technique using antisera, anti-A and anti-B obtained from Tulip Diagnostics (P) Ltd. Blood group has been determined on the basis of agglutination. Fertility performance of the couples such as data on total conception, live birth, still birth, spontaneous abortion and total pregnancy wastage have been analyzed by considering them as continuous variable. All Statistical Analysis have been carried out by SPSS 16.0 version. Chi-square test, Independent t-test and ANOVA test was performed and a significant (p) value of less than 0.05 has been taken into consideration for significance.

RESULTS AND DISCUSSION

It is revealed from the study that 55.34% of the couples are ABO compatible. Whereas the rests are ABO incompatible couples of 3 broad categories of incompatibles such A (21.36%), B (19.42%) and AB (3.88%). Most of the couples (85.4%) did not experience pregnancy wastage at all (Table-1) as present study considers only those couples who are having at least one live birth. When couples who are having only live birth are taken into consideration, ABO incompatibles (87.0%) are found to be more compared to compatibles (84.2%). While opposite picture is emerged among the couples who are having both live birth and pregnancy wastage (both still birth as well as spontaneous abortion). Couples who have the combination of live birth and still birth (8.7%) as well as those who are having both live birth and spontaneous abortion (4.3%) are found to be less among the ABO incompatibles. This indicates that ABO incompatibility due to maternal-fetal interactions has not played any significant role among the Meitei couples of the present study. Chi square test also do not reveal any significant difference between ABO compatible and incompatible couples, when it is observed with reference to the couples who are having only live birth and couples who are having combination of both live birth and pregnancy wastage.

Fertility performance is found to be more among the compatible Meitei couples when it is compared to incompatible couples (Table-2). Mean pregnancy (3.13) as well as live birth (2.93) and reproductive wastage (0.15) are found to be less in ABO incompatible mating type with mean differences of 0.308, 0.258, and 0.041 respectively to their compatible counterparts. Satyanarayana et al. (1978) in their investigation of 183 families of Visakhapatnam town of Andhra Pradesh mentioned that differences in the mean numbers of pregnancies as well as living children between compatible and incompatible are significant.

Average incidence of still birth is found to be slightly higher among the incompatibles (0.11) having a mean difference of 0.003 compared to compatible couples (Table-2). But average occurrence of spontaneous abortion is more (0.09) among the compatibles compared to incompatible (0.04) couples. It is important to mention that induced abortions are deducted from the pregnancy wastage as ABO incompatibility has no role play with it. Independent t-tests on conception, live birth, still birth, spontaneous abortion and pregnancy wastage do not reveal any statistical significant difference between ABO compatible and incompatible mating type. Most of the findings of earlier studies on ABO incompatibility in India reveal that fetal wastage is more in incompatible matings compare to compatible matings (Chakravartti and Chakravartti, 1978; Devi and Singh, 2008). Present study does not observe similar results may be due to the fact that ABO incompatibility occurs in 20% of pregnancies, but only 20% of these develop hemolytic condition which is milder than Rh incompatibility and can lead to abortion in the uterus (Scid and Elies, 2000; Nazarabadi et al., 2012).

Mean conception (5.67) as well as live birth (4.44) are again found to be higher among the compatible couples in contrast to incompatible couples, when the fertility performance of couples who are having both live birth as well as pregnancy wastage (Table-3) are taken into consideration. In this case average occurrence of spontaneous abortion (0.56) and total pregnancy wastage (1.22) are observed to be more among the compatibles. But still birth is found to be higher (0.83) among the incompatibles with a mean difference of 0.167 with compatibles. Mohanty and Das (2010) mentioned about marginally higher incidence of stillbirth while discussing the effects of natural selection on four population groups of Orissa in the form of differential fertility and mortality as a consequence of ABO incompatibility.

When fertility performance is observed with reference to ABO compatibility and all subtypes of incompatibility (A, B, AB-incompatibles) it is noticed that mean conception (3.50), live birth (3.25) and pregnancy wastage (0.25) are high among AB incompatibles (Table-4). But pregnancy wastage of four AB incompatible couples get affected by single occurrence of still birth due to which it is difficult to give any serious explanation. Besides AB incompatible, mean still birth (0.015) and spontaneous abortion (0.10) are found to be higher among the B incompatible couples. Fertility performance of AB incompatible couples is followed by ABO compatibles, B and A incompatibles. No significant difference (ANOVA test) is observed in the fertility performance of A, B, AB incompatible and ABO compatible couples. The possible differential effects of ABO blood group maternal-paternal (fetal) incompatibility was investigated by Sharma and Kapoor (2004) and revealed that the average number of live births per mating couple was slightly higher for the incompatible matings than the compatibles but that advantage was offset by higher postnatal mortality in the former.

It is observed from the study that in case of ABO compatible mating (blood group combinations), AB (wife) and A (husband) combination possess (Table-5) high mean pregnancy and live birth (4.67). Average incidence of spontaneous abortion (0.27) is found to be higher in O (wife) to O (husband) blend but mean still birth (0.33) as well as total reproductive wastage are more (0.43) in B (wife) and O (husband) combination. No significant difference (ANOVA test) is noticed in fertility performance among 9 ABO

blood group combinations of compatible couples. No incidence of pregnancy wastage of either still birth or spontaneous abortion is observed among 5 blood group combinations (wife and husband) of ABO compatible couples such as AB x O, B x B, AB x A, AB x B and AB x AB.

In case of ABO incompatible mating (Table-6) amalgamation of A (wife) and AB (husband) shows high mean conception (8.00), live birth (7.00), still birth (2.00) and reproductive wastage (2.00). But spontaneous abortion (mean-0.14) is observed more in O (wife) and B (husband) blend. Statistically significant differences (ANOVA test) are observed in pregnancy (sig.-0.008), live birth (0.035), still birth (sig.-0.000) and total reproductive wastage (sig.-0.000) among 7 ABO blood group blends of ABO incompatible couples. Reproductive wastage is not found in 2 blood group combinations of ABO incompatible couples namely B (wife) x A (husband) and B (wife) x AB (husband). The results partially supports the earlier findings that the couple combinations having O type (wife) and A or B type (husband) showed maximum foetal loss (Soni and Mukherjee, 2009).

It is observed from the study that mean pregnancy and live birth are comparatively lower in O x O mating couples than AB x AB mating couples. Results show that A x O and B x O compatible mating types found to have higher mean pregnancy, live birth and reproductive wastage compared to their reciprocal incompatible mating type (O x A and B x O). The results slightly differ from the findings of Sharma and Kapoor (2004) on a sample of 100 couples from three villages of Jind district of Haryana where no decrease in live births in O×A and O×B incompatible matings was observed compared with their reciprocal compatible ones. It is observed that O x AB, A x AB incompatible blends show high mean conception, live birth and pregnancy wastage in contrast to their reciprocal compatible blends (Table-5 and Table-6). Although amalgamation of B (wife) x AB (husband) are having very high mean conception and live birth in comparison to their compatible AB (wife) and B (husband) counterparts but no pregnancy wastage is noticed in both the groups.

CONCLUSION

The study discloses that mean pregnancy, mean live birth and mean pregnancy wastage are more among the compatible couples compared to incompatible couples. Average still birth is almost same in both the groups but mean spontaneous abortion is more among the compatibles. Among the subgroups of incompatibility AB incompatibles are having higher mean conceptions and live births compared to A and B incompatibles. Stillbirth and spontaneous abortion are more among the B incompatibles. Average conception, live birth, still birth and pregnancy wastage are found to more in the combination of A (wife) and AB (husband) blood group but amalgamation of O (wife) and O (husband) blood group are having highest occurrence of spontaneous abortion.

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TABLES

Table-1: Couples on the basis of ABO blood group Compatibility and Incompatibility

Mating Type		Couples who have			Chi- Square	Couples who have	
		Only LB	LB+SB+SA	Total		LB+SB	LB+ SA
Compatible	No. (%)	48 (84.2)	9 (15.8)	57 (100.0)	Value-0.154, d.f.-1, Sig.-0.694	6 (10.5)	3 (5.3)
Incompatible	No. (%)	40 (87.0)	6 (13.0)	46 (100.0)		4 (8.7)	2 (4.3)
Total	No. (%)	88 (85.4)	15 (14.6)	103 (100.0)		10 (9.7)	5 (4.9)

LB=Live Birth, SB=Still Birth, SA=Spontaneous Abortion

Table-2: Fertility Performance on the basis of ABO blood group Compatibility and Incompatibility

Mating Type	No. of Couples	Value	Total Conception	Live Birth	Still Birth	Spontaneous Abortion	Reproductive Wastage
Compatible	57	Sum	196*	182	6	5	11
		Mean	**3.44**	**3.19**	**0.11**	**0.09**	**0.19**
		S.E.	0.281	0.245	0.041	0.058	0.068
Incompatible	46	Sum	144*#	135	5	2	7
		Mean	**3.13**	**2.93**	**0.11**	**0.04**	**0.15**
		S.E.	0.267	0.261	0.056	0.030	0.062
Independent t-Test		t	0.782	0.719	0.051	0.635	0.433
(d.f.- 101)		Sig.	0.436	0.474	0.960	0.527	0.666
Mean difference			0.308	0.258	0.003	0.044	0.041

*=3 cases of induced abortion, *#=3 cases of induced abortion & 1 twin birth

Table-3: Fertility Performance on the basis of ABO blood group Compatibility and Incompatibility (couples who have live birth as well as pregnancy wastage).

Mating Type	No. of Couples	Value	Total Conception	Live Birth	Still Birth	Spontaneous Abortion	Reproductive Wastage
Compatible	9	Sum	51	40	6	5	11
		Mean	**5.67**	**4.44**	**0.67**	**0.56**	**1.22**
		S.E.	0.645	0.669	0.167	0.338	0.222
Incompatible	6	Sum	26[#]	20	5	2	7
		Mean	**4.33**	**3.33**	**0.83**	**0.33**	**1.17**
		S.E.	0.919	0.919	0.307	0.211	0.167
Independent t-Test		t	1.226	1.002	0.519	0.492	0.181
(d.f.- 13)		Sig.	0.242	0.335	0.613	0.631	0.859
Mean difference			1.333	1.111	0.167	0.222	0.056
[#]=1 twin birth							

Table-4: Fertility Performance on the basis of ABO Blood Group Compatibility and subtypes of Incompatibility

Mating Type	No. of Couples	Mean or Average				
		Total Conception	Live Birth	Still Birth	Spontaneous Abortion	Reproductive Wastage
Compatible	57	**3.44** (196*)	**3.19** (182)	**0.11** (6)	**0.09** (5)	**0.19** (11)
A Incompatible	22	**3.05** (67**)	**2.91** (64)	**0.05** (1)	**0.00** (0)	**0.05** (1)
B Incompatible	20	**3.15** (63*[#])	**2.90** (58)	**0.15** (3)	**0.10** (2)	**0.25** (5)
AB Incompatible	4	**3.50** (14)	**3.25** (13)	**0.25** (1)	**0.00** (0)	**0.25** (1)
ANOVA	F	0.259	0.213	0.574	0.435	0.772
(d.f.- 102)	Sig.	0.855	0.888	0.633	0.729	0.512
*=3 induced abortion , **=2 induced abortion, *[#]=1 induced abortion & 1 twin birth, In bracket the figure shows number of occurrence						

Table-5: Fertility Performance of Compatible couples on the basis of ABO blood group combinations

Mating Type W * H	No. of Couples	Mean or Average				
		Total Conception	Live Birth	Still Birth	Spontaneous Abortion	Reproductive Wastage
O*O	11	3.09 (34*)	2.55 (28)	0.00 (0)	0.27 (3)	0.27 (3)
A*O	15	3.60 (54)	3.50 (51)	0.13 (2)	0.07 (1)	0.20 (3)
B*O	9	3.89 (35)	3.44 (31)	0.33 (3)	0.11 (1)	0.44 (4)
AB*O	4	3.00 (12)	3.00 (12)	0.00 (0)	0.00 (0)	0.00 (0)
A*A	4	4.25 (17)	4.00 (16)	0.25 (1)	0.00 (0)	0.25 (1)
B*B	8	2.50 (20)	2.50 (20)	0.00 (0)	0.00 (0)	0.00 (0)
AB*A	3	4.67 (14)	4.67 (14)	0.00 (0)	0.00 (0)	0.00 (0)
AB*B	1	1.00 (1)	1.00 (1)	0.00 (0)	0.00 (0)	0.00 (0)
AB*AB	2	4.50 (9)	4.50 (9)	0.00 (0)	0.00 (0)	0.00 (0)
ANOVA (d.f.- 56)	F	0.712	0.995	1.185	0.334	0.586
	Sig.	0.680	0.452	0.328	0.948	0.785
*=3 induced abortion, In bracket the figure shows number of occurrence						

Table-6: Fertility Performance of Incompatible couples on the basis of ABO blood group combinations

Mating Type W * H	No. of Couples	Mean or Average				
		Total Conception	Live Birth	Still Birth	Spontaneous Abortion	Reproductive Wastage
O*A	9	2.22 (20)	2.11 (19)	0.11 (1)	0.00 (0)	0.11 (1)
O*B	7	3.71 (26*)	3.43 (24)	0.00 (0)	0.14 (1)	0.14 (1)
A*B	12	2.42 (29)	2.25 (27)	0.08 (1)	0.08 (1)	0.17 (2)
B*A	10	3.20 (32*)	3.10 (31)	0.00 (0)	0.00 (0)	0.00 (0)
O*AB	4	3.50 (14)	3.25 (13)	0.25 (1)	0.00 (0)	0.25 (1)
A*AB	1	8.00 (8#)	7.00 (7)	2.00 (2)	0.00 (0)	2.00 (2)
B*AB	3	5.00 (15*)	4.67 (14)	0.00 (0)	0.00 (0)	0.00 (0)
ANOVA (d.f.- 45)	F	3.416	2.546	9.922	0.510	5.890
	Sig.	**0.008**	**0.035**	**0.000**	0.797	**0.000**

*=1 induced abortion, #=1 Twin birth, In bracket the figure shows number of occurrence

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