

## INFLUENCE OF ABO INCOMPATIBILITY IN THE OUTCOME OF PREGNANCY (STILL BIRTHS)

by

V. K. SINGH,\*

S. BAJPAL\*\*

and

P. ROHATGI\*\*\*

One of the distressing problems, still unsolved in obstetrics, is unexplained still births. Since the foetus depends entirely upon the maternal decidual tissue for nourishment, any conflict between the cells of these two individuals jeopardises foetal existence. This could be the result of a conflict of foetal and maternal blood groups, in other words ABO incompatibility resulting in antigen antibody reactions between the maternal and foetal surfaces. The mechanism of the immune reaction resulting in incompatibility between foetus and mother owing to husband and wife incompatibility is a complex one and an attempt has been made in the present study to evaluate the role of ABO incompatibility in causation of still births.

### Material and Methods

One hundred and eleven couples from the inpatient and outpatient departments of UISE Maternity Hospital were included in the present study. This comprised of 66 controls who had all live births, 20 cases with one or more unexplained still

births and 25 cases who had abortions as well as still births. A detailed history was taken, a complete clinical examination was done in all the couples and all Rh -ve women were excluded from the study.

Peripheral smears from the mothers were examined for the presence of foetal cells at term. ABO grouping and maternal smears were examined by Dacie's method (1966). Antibody titres were done by Kolmer's method (1960) within 24 hours of delivery. The sera of mother of ABO incompatible blood group were titrated for Anti-A and Anti-B antibodies at term and within 48 hours of delivery.

### Observations

A comparison of present series with that of general population of Kanpur (figures obtained from Blood Bank, GSVM Medical College, Kanpur) showed that incidence of group O was 33.38% in study groups and 28.6% in general population and that of group A was 30.61% and 26.0% respectively. Group B and AB was less in study group (31.22 and 4.29%) than general pattern (26.0% and 9.4%).

No correlation was found between age

\*Reader.

\*\*Demonstrator.

\*\*\*Professor and Head.

Department of Obstetrics and Gynaecology,  
G.S.V.M. Medical College, Kanpur.

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of the patient and incidence of stillbirth in stillbirth group. Maximum number of stillbirths occurred in 2nd pregnancy (39.29% and 32.14% respectively). Average number of live births was higher (2.35/couple) in control group than stillbirth group (0.64/couple). No significant difference was found in average numbers of stillbirths in various socio-economic groups.

The blood group 'O' was more (46.67%) in stillbirths than control mothers (27.28%) and B (25.79%) and AB groups (4.44%) was low in stillbirths cases than controls (34.84% and 12.12%), ( $\chi^2$  test = 16.25 significant  $P < 0.05$  for 3 d.f.). Amongst fathers, 'O' group was 17.78%, A 46.67% and B 28.89% in stillbirth group and 25.76%, 31.82% and 42.42% in control group being significant ( $P < 0.05$  for 3 d.f.).

Incidence of compatible couples was higher (68.18%) than the incompatibles (31.82%) in controls and incompatible couples were more in stillbirth series (53.33%) than controls (31.82%). Average number of stillbirths was slightly higher (1.37/couple) in ABO incompatible couples than compatibles (1.09/couple).

The commonest incompatible combination in controls was O mother and B father (33.35%) and in stillbirths 'O' mother 'A' father (33.34%). The commonest compatible combination in controls being 'B' parents > A parents and in stillbirth 'A' parents > 'O' parents. Anti-A and Anti-B antibodies in ABO incompatibles controls group have been shown in Tables I and III.

TABLE I  
Anti-A and Anti-B Antibody Titres in Group 'O' Females of Control and Stillbirth Groups

Groups/Type of Anti-body	No. of cases	Positive Anti i b		Antibody titre in different dilutions											
		No.	%	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024		
Anti-A Control	11	6	54.54	1	2	2	1	—	—	—	—	—	—	—	—
Anti-A Stillbirth	16	10	62.50	—	—	—	5	2	1	—	—	—	—	—	—
Anti-B Control	11	6	54.54	—	2	3	1	—	—	—	—	—	—	—	—
Anti-B Stillbirth	16	10	62.50	—	—	1	3	1	—	—	—	—	—	—	—

TABLE II  
Anti-A, Anti-B Antibodies in Group 'O' Females Married With 'A' 'B' Males in Stillbirth Group

Groups/Type of Anti-body	No. of cases and %	Positive Anti i b		Antibody titre in different dilutions									
		No.	%	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024
<i>Anti-A</i>													
O x A	8(50.0)	5	50.0	—	—	—	3	1	1	—	—	—	—
O x B	7(43.75)	4	40.0	—	—	—	2	1	—	—	1	—	—
O x AB	1 (6.25)	1	10.0	—	—	—	—	—	—	—	—	1	—
Total —	16(100)	10	100	—	—	—	5	2	1	—	1	1	—
<i>Anti-B</i>													
O x A	8(50.0)	5	50.0	—	—	1	2	1	1	—	—	—	—
O x B	7(43.75)	4	40.0	—	—	—	1	—	2	—	1	—	—
O x AB	1 ( 6.25)	1	10.0	—	—	—	—	—	—	—	—	1	—
Total —	16(100)	10	(100)	—	—	1	3	1	3	—	1	1	—

TABLE III  
Anti-A and Anti-B Antibodies in Groups A and B Females of Control and Stillbirth Groups

Groups/Type of Anti-body	No. of cases	Positive Anti i b		Antibody titre in different dilutions									
		No.	%	1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024
<i>Anti-A</i>													
Control	5	1	20.0	—	—	—	1	—	—	—	—	—	—
Stillbirth	5	2	40.0	—	—	—	—	1	—	1	—	—	—
<i>Anti-B</i>													
Control	5	—	—	—	—	—	—	—	—	—	—	—	—
Stillbirth	3	1	33.33	—	—	—	—	—	—	1	—	—	—

### Discussion

Unexplained foetal wastage before and after the age of viability is a very distressing problem, 'ABO' incompatibility has been implicated as one of the causes. Observations show that there has been a difference in the incidence of blood groups in general population of Kanpur and that included in present study. The reason probably is that the number of cases included in present series is less in number. The distribution of blood groups has not been similar in control and stillbirth series, but there has been higher incidence of 'O' groups than B and AB groups in stillbirth series. Incidence of group 'A' was similar in controls and stillbirths, but group 'O' was 46.67% in stillbirths as compared to 25.76% in controls. Group A was higher (46.67%) in stillbirth fathers than controls (31.82% whereas group O was more in controls (25.76%) than study group (17.78%) fathers. The findings are in agreement with Wren and Vos (1961). The comparative figures for group B stillbirths 22.22% and controls (10%) has not been mentioned by any one. ABO incompatible matings were more in study group (53.33%) than controls (31.82%). The commonest being 'O' mother 'A' father (33.34%) and 'O' mother 'B' father being next (29.2%). Commonest incompatible combination in controls series has been 'O' mother, B father mating (33.35%). Average number of stillbirths being 1.37/couple in incompatibles as compared to 1.09/couple in ABO compatibles. Hirszfeld and Zborowski (1945), Kirk *et al* (1955) Matsunage and Itoh (1958) have reported similar findings. 48.89% females in study group have first unexplained still birth also. Average number of live births was 2.35/family in controls and 0.64%/family

in stillbirths. Comparative figures have not been reported by any one.

It is well known that antibody reaction can occur when foetal blood enters maternal circulation. If this occurs late in pregnancy it may result in stillbirths. Both Anti-A and B antibodies are found in mothers carrying group A, B or AB foetus, thus having high foetal loss in 'O' mothers. In our study also highest incidence of stillbirths (33.34%) have been found in 'O' female 'A' male matings. Wren and Vos (1961) and many more workers have made similar studies. The commonest compatible combination in controls is 'B' husband and wife (28.89%) and 'A' male and female in stillbirths (38.09%). Commonest incompatible controls were 'O' female 'B' male (33.35%) and 'O' female and 'A' male in stillbirths (33.34%). Wren and Vos (1961) differ in the first instance ('O' female and 'A' male — 50%) but unfortunately no one has specified the findings for stillbirths so far.

When foetus inherits dominant A or B agglutigen from father which is not present in mother, it evokes isoimmune response in maternal blood and antibodies are formed in maternal blood and thus foetal blood group becomes incompatible with maternal blood. A study of anti-A and anti-B antibody titre in this reference shows their presence upto 1:64 dilution in 54.54% control cases. Raha and Mitra (1977) found Anti-A antibody in 96.47% and Anti-B antibodies in 98.82% cases up to 1:64 dilution and above this only in 3.53%.

In stillbirth cases both Anti-A and B antibodies were present in 50% cases up to 1:64 and 12.5% cases had above 1:64 dilutions (Table I). In group B females married with A, AB husbands, only 20% had antibody in 1:16 and in stillbirth, out

of 5 cases 2 (40%-1:128) had anti-A antibodies. Anti-B antibodies were not detected in control A females but were present in 33.33% stillbirths (1:128) Table III. Antibodies have been found in higher dilution in stillbirths than in controls and incidence being highest in O females married with A males, antibody titre being higher in stillbirth and so is the definite incidence of heterospecific matings. The heterospecific pregnancy which resulted in antibody formation in maternal circulation reach foetus across placenta to produce antigen antibody reaction resulting in foetal death. Though this may not be the sole cause of foetal death, but many cases of unknown or unexplained etiology can be attributed to maternal isoimmunisation by dominant 'A' or 'B' foetal agglutinin.

#### Conclusions

In all a total of 111 couples were studied including 66 controls, 20 having unexplained stillbirths and 25 having stillbirth and abortions to assess the role of ABO incompatibility in case of stillbirth. Like abortions series, 'O' mothers were more than 'O' fathers in study group 'A'

fathers were more and AB mothers were less than controls. ABO incompatible matings were also higher in stillbirths. The commonest compatibles 'A' wife and 'A' husband and incompatibles being 'O' wife and 'A' husband in them. Anti-A and Anti-B antibodies were found more frequently and in higher dilutions in stillbirths series than the controls. Though stillbirths can not be explained purely on this basis, but it is certainly an important contributing factor.

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