

## ROLE OF ABO GROUPS AND SECRETOR STATUS IN STERILITY

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### SUMMARY

301 couples with primary sterility were investigated for secretor status and cervical anti-A/anti-B antibodies. Incidence of secretor status and ABO incompatibility was comparable with that observed in the general population. 10.1% women had anti-A/anti-B antibodies in their cervical secretions. These antibodies were more often ( $P < 0.05$ ) detected in O group women. Concentration of cervical anti-bodies was directly proportional to anti-A/anti-B levels in the serum. 75% O group women with cervical antibodies had ABO incompatible husband. When tested with cervical antibodies, marked reduction in the mobility of the sperms from ABO incompatible husband, was observed. These observations need more elucidation as to their effect on fertility.

### Introduction

Approximately 9 to 25 per cent of infertility cases are unexplained (Southam, 1960). Matsunaga and Itoh (1953) and Behrman *et al* (1960) indicated ABO incompatibility with husband as a possible cause for some of these cases. This issue is however, still controversial. Studies have been done on uterine secretions to find out their role in infertility (Shulman *et al*, 1978). ABO antibodies have been found in cervical mucus (Gershowitz *et al*, 1958; Behrman *et al*, 1960). Con-

sidering action of these antibodies on spermatozoa possessing respective ABO antigens, it was concluded that these antibodies are harmless (Parish and Ward, 1968). However Akerman (1967) observed definite metabolic changes in spermatozoa when incubated with immune incompatible anti-A or anti-B.

Present study was undertaken to assess the role of ABO incompatibility and cervical antibodies in patients with primary sterility.

### Material and Methods

Infertile couples attending clinic at Chowpaty Maternity Hospital were investigated. They were entered in this

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study if the wife failed to conceive for more than 2 years after marriage, ispite of the couple's desire for child. To exclude other causes of sterility all these couples were investigated for function of endometrium, fallopian tube patency, semen examination and disease conditions like diabetes. Details regarding age, year of marriage, consanguinity, caste etc. were collected by personal interview.

The couple was investigated for ABO group, secretor status and titre of anti-A and anti-B. Wife was further investigated for anti-A and anti-B in cervical secretions. If these antibodies were present, sperm mobility test was done using husband's semen. ABO group, secretor status and saline anti-A and anti-B titres were done as reported earlier (Bhatia, 1972). Cervical secretion was diluted with equal volume of saline and centrifuged. The supernatant was tested for saline anti-A and anti-B.

*Results*

Three hundred and one couples with primary sterility were investigated. One hundred and Thirty-four (44.5%) were Maharashtrians, 12 (4.0%) Muslims, 30 (10.0%) South Indians, 41 (13.6%) Gujarathis and remaining 84 (27.9%) were of other caste. Period of infertility varied from 2 to 20 years. Two hundred and forty-five women were less than 30 years at the time of marriage while others were above 30 years. Only five couples had consanguinious marriage.

Classification of 301 cases on the basis of aetiological factor, is given below.

In 129 (43%) cases husband was ABO incompatible with the wife.

Table I does not show significant variation in the incidence of ABO combinations of wife, husband in the cases of infertility of known and unknown aetiology.

Incidence of Sec x Sec is comparable in the cases of infertility with known and unknown aetiology (Table II). In other secretor combinations number of cases are too small for comparison.

Twenty-eight (10.1%) out of 278 women, showed the presence of cervical antibodies. Sixteen (57.1%) of them were 0 group, of which 12 (75%) had ABO incompatible husband. Out of 94 group 0 women not possessing ABO antibodies in the cervical discharge, 58 (61.7%) had ABO incompatible husband. Compared to A group women cervical antibodies were more frequently detected in 0 group women ( $p < 0.05$ ). Table III also shows that cervical antibodies are more often present among the women with known than unkown cause of infertility. This is also true for 0 group women in this category. In all the women possessing cervical antibody, serum anti-A/anti-B titre level was 1:64 or higher. Cervical secretions containing ABO antibody was tested with husband's semen. There was marked reduction in the mobility of the sperms from ABO incompatible husbands in comparison to the ABO incompatible. Incidentally in 8 cases, husbands were ABO incompatible as well as Oligospermic.

|     | Block<br>Tubes | Non-Secreting<br>Endometrium | Azo-<br>spermia | Oligospermia<br><40 mil/mm | Semen<br>not<br>examined | Unex-<br>plained |
|-----|----------------|------------------------------|-----------------|----------------------------|--------------------------|------------------|
| No. | 6              | 4                            | 18              | 76                         | 66                       | 131              |
| %   | 2.0            | 1.3                          | 6.0             | 25.3                       | 21.9                     | 43.5             |

TABLE I  
Correlation of ABO Compatibility of Infertile Couple With Known and Unknown Aetiology

| Aetiology        | Wife x Husband ABO group combinations |        |        |       |                |       |       |           |       |      |
|------------------|---------------------------------------|--------|--------|-------|----------------|-------|-------|-----------|-------|------|
|                  | ABO Incompatible                      |        |        |       | ABO Compatible |       |       |           |       |      |
|                  | OXA/B/AB                              | AXB/AB | BXA/AB | Total | OXO            | AXA/O | BXB/O | ABXA/B/AB | Total |      |
| Known<br>(102)   | No                                    | 25     | 12     | 9     | 46             | 10    | 16    | 21        | 9     | 56   |
|                  | %                                     | 24.5   | 11.8   | 8.8   | 45.1           | 9.8   | 15.7  | 20.6      | 8.8   | 54.9 |
| Unknown<br>(131) | No                                    | 32     | 11     | 11    | 54             | 19    | 24    | 21        | 13    | 77   |
|                  | %                                     | 24.4   | 8.4    | 8.4   | 41.2           | 14.5  | 18.3  | 16.0      | 9.9   | 58.8 |

Note: Figures in the ( ) indicate total nos.

TABLE II  
Secretor Status in ABO Compatible and Incompatible Couples with Known and Unknown Infertility Aetiology

| Secretor<br>(Sec)<br>status |         | Known Aetiology           |                             | Unknown Aetiology         |                             |
|-----------------------------|---------|---------------------------|-----------------------------|---------------------------|-----------------------------|
|                             |         | ABO Compatible<br>Husband | ABO Incompatible<br>Husband | ABO Compatible<br>Husband | ABO Incompatible<br>Husband |
| Sec                         | Sec     | 45 (88.2)                 | 39 (88.6)                   | 65 (86.7)                 | 49 (87.5)                   |
| Sec                         | Non Sec | 3 (5.9)                   | — (0)                       | 5 (6.7)                   | 3 (5.4)                     |
| Non Sec                     | Sec     | 3 (5.9)                   | 2 (4.6)                     | 3 (4.0)                   | 3 (5.4)                     |
| Non Sec                     | Non Sec | — (0)                     | 3 (6.8)                     | 2 (2.6)                   | 1 (1.7)                     |
| Total                       |         | 51 (100)                  | 44 (100)                    | 75 (100)                  | 56 (100)                    |

Note: Figures in the ( ) indicate percentage values.

TABLE III  
Analysis of Cervical Antibodies on the basis of ABO Groups and Aetiological Factor

| Group of Wife | Total Cases       | ABO Incompatible Husband | Aetiology         |                 |
|---------------|-------------------|--------------------------|-------------------|-----------------|
|               |                   |                          | Known             | Unknown         |
| O             | 16*/110<br>(14.5) | 12*/70<br>(17.1)         | 7*/31<br>(22.6)   | 8*/58<br>(13.8) |
| A             | 4/90<br>(4.4)     | 1/33<br>(3.0)            | 1/28<br>(3.6)     | 3/38<br>(7.9)   |
| B             | 8/78<br>(10.3)    | 2/24<br>(8.3)            | 5*/30<br>(16.7)   | 2/35<br>(5.7)   |
| Total         | 28/278<br>(10.1)  | 15/127<br>(11.8)         | 13**/89<br>(14.6) | 13/13<br>(9.9)  |

No. with cervical antibodies/No. tested.

Figures in the ( ) indicate % values.

\* Significantly higher incidence compared to A group ( $p < 0.05$ ).

\*\* In 8 cases husbands were ABO incompatible as well as Oligospermic.

### Discussion

Behrman *et al* (1960) suggested that ABO incompatibility might be the cause for infertility. They reported higher incidence of nonsecretors and ABO incompatible couples in their infertility series. In the present study incidence of secretor status and ABO incompatibility was comparable with that observed in the general population (Bhatia, 1972). Results were also comparable among the infertility cases with known and unknown aetiology.

The presence of A and B antigens on human spermatozoa has been well established (Landsteiner and Levine 1926; Levine and Celano 1961). Several studies have also reported ABO antibodies in the cervical secretions (Clarke 1968; Parish and Ward 1968). The incidence of cervical antibodies differ in different studies depending upon the technique used. Overall incidence of

cervical antibodies in the present study was 10.1%. As reported by others (Behrman *et al* 1960) we also found higher incidence of cervical antibodies in group O women (17.1%). Interestingly 75% of the O group women possessing cervical antibodies, had ABO incompatible husband. This incidence was higher compared to those not having antibody (61.7%). However, this increase was not statistically significant. Considering action of blood group antibodies on spermatozoa Parish and Ward (1968) reported them to be harmless. On the other hand, Ackerman (1967) found definite metabolic changes after incubating sperms with immune anti-A or anti-B. Our studies showed detrimental effect of cervical ABO antibodies, on sperm mobility when husband was ABO incompatible. Husbands of 8 women having cervical antibodies were ABO incompatible as well as Oligospermic. It is likely that in such couples the secreting anti-

bodies may immobilize the already scanty number of sperms, thus resulting in sterility. Such immobilization was indeed confirmed in number of them by in vitro test. One O group woman with ABO incompatible husband developed typical vasovagal attack after artificial insemination with husband's semen. Concentration of cervical antibodies in this case was 1:16 and her serum showed IgM and IgG anti-A/anti-B level above 1:128.

Many of the infertility patients are subjected to hormone treatment. It is possible that such a treatment may influence the synthesis of secretory antibodies. The findings of Schumacher (1974) suggested that hormones, besides affecting secretions of locally synthesized IgA immunoglobulins, may also infiltrate serum IgG into secretions possibly via increased permeability in the beginning of menstrual cycle. These observations however need more elucidation as to their effect on fertility.

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