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Relationship between antisperm antibodies and seminogram characteristics

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Abstract
Background: Autoimmunity to spermatozoa could compromise male fertility in at least three fundamental areas: Interfering with the creation of normal amounts of spermatozoa, decreasing their ability to migrate, and impairing their ability to engage with ovum.
Objective: This study's objective was to assess the association between infertile male individuals' seminogram features and the existence of antisperm antibodies.
Material and Methods: In the present study semen analysis was done by sperm quality analyzer II CP and antisperm antibody by varelisa sperm antibodies enzyme immunoassay kit.
Statistical Analysis: The data obtained was analyzed by using mean ± standard deviation and chi-square test.
Results: The presence of antisperm antibodies in the serum of infertile male was statistically not significant with their seminogram characteristics.
Conclusion: Presence of antisperm antibodies in serum of subjects with different seminogram characteristics without any significant difference proved that ASA may not be involved directly in affecting seminogram parameters.

Keywords: Male infertility, autoimmunity, seminogram characteristics, antisperm antibodies, concentration, motility, morphology

Introduction

The antisperm antibodies (ASA) are one of the many immunological markers that get consideration in evaluating immunological infertility [1]. Since the unique constituents of semen make their appearance rather late in the life of an individual, some of them are potentially autoantigenic. Under appropriate circumstances, an individual should be capable of mounting an immunologic response to elements of his own semen. Autoimmunity to spermatozoa could compromise male fertility in at least three fundamental areas:

- Interference with the production of normal spermatozoa
- Reduction in the migratory potential of spermatozoa, and
- Impairment of the interaction of spermatozoa with the ovum [2].

Sertoli cells form an immunologic barrier by actively phagocytosing & degrading sperm & residual body products which would be a major source of antigenic stimulation if permitted to leak from the seminiferous tubule. Tight junctions are found throughout other regions of the male reproductive tract but these junctions are weak in the rete testes & efferent ducts & these are the sites for entrance of immune mediators into the sperm compartment [3]. Any breach of the blood testis barrier exposes sperm cells to the immune system, thereby provoking an immune response [2]. Both T and B cells, natural killer cells, macrophages, polymorphonuclear leukocytes, and complement activity all inhibited by semen and plasma. This helps protect adult males from developing both humoral and cellular autoimmunity. The development of ASA in both males and females as well as antibodies against oocytes result from the breakdown of this mechanism [4]. The effects of ASA include immobilizing sperm in mucus, inducing complement-mediated cell lysis or macrophage phagocytosis, interfering with capacitation or the acrosome reaction, and faulty contact with the ovum [5]. So the aim of present study was to find out the relationship between presence of ASA in serum and seminogram characteristics in infertile male subjects.

Material and Methods

Semen samples were taken from 109 male patients between the ages of 21 and 55 who were complaining of infertility at the Reproductive Biology Unit, MGIMS, Sevagram. A thorough medical and surgical history was collected, as well as information on the patient's current and previous illnesses. To rule out the exclusion criteria, selected male partners had extensive surgical assessment of the genito-urinary system. The study comprised subjects with a normally developing genitor-urinary system. All tests were carried out with the proper approval of the institute's ethics committee and the subjects' written agreement. Three days of sexual abstinence later, specimens of semen were obtained through masturbation. Following complete liquefaction, samples were examined for sperm concentration, motility, and morphology using a SQA II CP sperm quality analyzer (Medical Electronic System Ltd.) in accordance with WHO guidelines (WHO, 1992) [6] and divided into the following four categories -

Normozoospermics

Individuals whose sperm concentration is 20 millions/ml or above, whose sperm motility is at least 50%, and whose sperm morphology is at least 30%.

Oligoasthenoteratozoospermics

Sperm concentrations of less than 20 million per milliliter, sperm motility of less than 50%, and sperm morphology of less than 30% in individuals**.**

Asthenoteratozoospermics

Those who have sperm concentrations of 20 million or more per milliliter, sperm motility under 50%, and less than 30% of their sperm exhibit normal morphology.

Azoospermics

Semen completely devoid of spermatozoa (even after centrifugation).

Determination of Circulating Antisperm Antibodies

A commercially available Varelisa Sperm Antibodies Enzyme Immunoassay kit (OSB India Agencies Pvt Ltd, New Delhi) was used to measure the levels of circulating antisperm antibodies.

Exclusion criteria

The study eliminated participants who had vericocoele, hydrocoele, undescended testicles, structural abnormalities, or a history of genitourinary tract surgery that would affect male fertility. subjects who have recently undergone chemotherapy for cancer, have a history of acute febrile illnesses, or who are using any hormonal preparations that may directly inhibit spermatogenesis [6] were also left out of the research.

Statistical Analysis

The Z-test and chi-square test were used for statistical analysis, which combined descriptive and inferential statistics. SPSS 17.0 and Graph Pad Prism 5.0 were the statistical programs used in the analysis. The 5% level of significance was used to test the results.

Results

There were 54 Normozoospermic, 22 Asthenoteratozoospermic, 18 Oligoasthenoteratozoospermic and 15 Azoospermic subjects. Mean age of different group of subjects were: Normozoospermic 31.4 $\pm$ 4.1 years, Asthenoteratozoospermic 32.0 $\pm$ 5.3 years, Oligoasthenoteratozoospermic 31.2 $\pm$ 4.2 years and Azoospermic 30.6 $\pm$ 4.4 years. It was found that (17) 31.5% of normozoospermic, (7) 31.8% of asthenoteratozoospermia, (4) 22.2% of oligoasthenoteratozoospermic and (5) 33.3% of azoospermic male possessed antisperm antibodies. The presence of antisperm antibodies in the serum of infertile male was statistically not significant with their seminogram characteristics.

Discussion

The relationship between sperm count and antibody occurrence was noted by W R Jones, who stated that autoimmunity to sperm antigens can be related to infertility in men by an association with disordered spermatogenesis resulting in oligospermia and azoospermia and involves cellular immunity and cytotoxic antibodies [7].

On comparing the seminogram characteristics with ASA positivity, we found that, presence of ASA in the serum of infertile male is statistically not significant with their seminal characteristics *viz* concentration, morphology & motility and this is in accordance with the Jonathan PJ 1992 [8], found the sperm motility of patients with antibodies was not significantly different from that of patients without antibodies and patients with isolated asthenopermia did not have a significantly higher prevalence of ASA. Our finding is contradict the DG Dimitrova 1994 [9], who found the significantly increased incidence (53%) of antisperm cell mediated immunity in the asthenozoospermic infertile men compared with the men from fertile couples and sperm donors by ELISA.

In our study presence of ASA in oligoasthenoteratozoospermic male was not significant, this is supported by Hobarth *et al* 1994 [10], found only 5% incidence of sperm-reactive antibodies in oligoasthenoteratozoospermic (OAT) as compared to normal fertile men by using fluorescein-labeled antiglobulin test. We found amongst 18 oligospermic, 4 (22.2%) were positive for ASA & this finding is contradicted by Fjallbrant 1965 [11], who found only one oligospermic subject possessed ASA by macroscopic direct sperm agglutination test of Kibrick and mucus penetration ability of the spermatozoa by Kremer. Our finding also contradict the Subbi Mathur *et al* 1983 [12], who noted 68% of oligospermic male were autoimmune to spermatozoa by using modified coombs' test and passive Hemagglutination assay. This elevated antibody titers was in both the secretions semen as well as serum. Therefore serum monitoring for sperm-reactive antibodies in the OAT patients has limited clinical relevance.

Our study shows 33.3% of azoospermic men were positive for antisperm antibodies and this finding was opposed by Anusha K *et al*. 1999 [13], who noted none of the azoospermic male was ASA positive by ELISA test. Presence of ASA in the serum of an azoospermic man indicates a blockage in the male genital tract [14] So, ASA positive azoopsermic man may possess obstruction or occlusion in the reproductive tract & extravasation of sperm or portions of sperm into interstitial and vascular spaces is responsible for formation of circulating and local antisperm antibodies in obstruction [15] this spermatozoa may be observed in the interstitium, lymph vessels, or even blood

capillaries of the epididymis as a result of an occlusion [16] therefore, the spermatogenesis resulting from an occlusion of the vas deferens or the epididymal duct might lead to the formation of sperm antibodies [17].

Table 1: ASA in Infertile Males with Different Seminogram Characteristics

Seminal Characteristics	Anti-Sperm Antibody in Infertile Male			
	Positive	% Incidence	Negative	% Incidence
Normozoospermic (54)*	17	31.5	37	68.5
Asthenoteratozoospermic(22)	7	31.8	15	68.2
Oligoasthenoteratozoospermic (18)	4	22.2	14	77.8
Azoospermic (15)	5	33.3	10	66.7
Total (109)	33	30.3	76	69.7

*number of subjects (P Value >0.05)

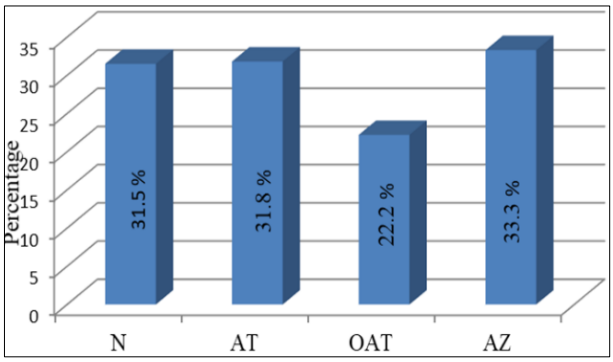

Fig 1: % Incidence of ASA in infertile male

Conclusion

Insignificant difference in the occurrence of antisperm antibodies in subjects with normal and abnormal ejaculates suggested that the autoimmunity to spermatozoa may play insignificant role in impairing seminogram characteristics *viz* count, motility, morphology etc. The exact mechanisms by which antisperm antibodies in the serum of infertile males affect fertility remains unclear and needs further in depth study.

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