Pattern of semen fluid abnormalities in male partners of infertile couples in Riyadh, Saudi Arabia

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Introduction: A decline in semen quality in men with increasing percentage of male factor abnormalities in infertile couples has been reported. The pattern of abnormalities differs from one part of the world to another, and it is probably multifactorial.

Our objectives were to review the pattern of semen fluid abnormalities in Saudi male partners of infertile couples, to establish prevalence and help future identification of responsible etiologies and possible treatments.

Materials and methods: A retrospective study of semen analysis results of male partners of infertile couples examined in a dedicated infertility clinic, King Khalid University Hospital, Riyadh, Saudi Arabia from January 2009 through December 2011.

Results: A total of 1485 male semen analysis reports were

Introduction

In Eastern countries, including Saudi Arabia, infertility is a devastating problem for both partners and may cast a heavy shadow on the physiological and social

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reviewed. According to 1999 WHO reference values for normal semen analysis, 61 (4.1%) of patients had normal semen parameters while 149 (10%) had azoospermia. Half of the samples (783, 52.7%) had single factor abnormality; the majority (97%) being teratospermia. Oligo-teratospermia was evident in 133 (9%) of the samples constituting nearly half of those who had 2 factor abnormality. Oligo-asthenoteratospermia was encountered in 191 (12.9%) patients. Oligospermia was evident in 403 (27.2%) patients; 52% of them had sperm concentrations of more than 10 million/mL. Twelve patients had only low volume ejaculate. **Conclusion:** A high percentage of semen fluid and sperm morphology abnormalities were found in males of infertile couples in Riyadh, Saudi Arabia which may contribute to subfertility. Further studies are needed to address possible etiologies and treatment of oligospermia and teratospermia

Key Words: semen analysis, infertility, male factor, fertility work up, Saudi Arabia

in our region in order to improve fertility rates.

adequacy of the female who is often held responsible for this problem. Whereas females are usually willing and ready to undergo medical investigations, attend infertility clinics and counseling, the males are often reluctant to do so.¹²

Semen analysis is the cornerstone of the work up, diagnosis, and treatment of male infertility.³ Semen parameters (e.g., appearance, volume, pH, liquefaction, concentration, motility, morphology, viability, and presence of leukocytes) have been found to be important determinants of functional competence of the spermatozoa.³⁻⁵ Population studies suggest that 30%-50% of infertility is male factor in origin,⁶⁷ yet the incidence is not known in Saudi men with suspected sub-fertility/infertility. The investigation of male factor

contribution to infertility in this part of the world is still difficult because of social stigmata and cultural attitude of male chauvinism, which blames infertility on the female partner. To our knowledge, this is the first study to analyze semen quality in a large group of male partners of infertile Saudi couples to review patterns of their semen fluid abnormalities in order to establish prevalence of male factor contribution and to help future identification of responsible etiologies and possible treatments.

Materials and methods

Study subjects

After approval by the institutional review board the first semen sample collected by each of 1485 consecutive men over a 36 month period (January 2009 through December 2011) at King Khalid University Hospital, Riyadh, Saudi Arabia was evaluated. All men were partners of infertile couples presented for infertility evaluation at the infertility center.

Semen analysis

After 2-5 days of sexual abstinence, semen specimens were collected into a wide-mouthed plastic sterile container. Patients were instructed to maintain the samples at body temperature (37^o C) and to deliver them within 1 hour after collection. All samples were analyzed within 10 minutes by the same senior laboratory scientist to avoid interobserver variation. Individuals on antibiotics or samples with leakage or

TABLE 1. Semen parameters of 1485 Saudi men

no label were excluded. Parameters analyzed included semen volume, sperm concentration, morphology, and sperm motility. Seminal fluid volume was measured with a 5 mL calibrated syringe. Sperm concentration was measured using the MicroCell chamber (Conception Technologies, San Diego, CA, USA). Sperm morphology was assessed in a prestained slide (Testsimplets, Mannheim Boehringer, Mannheim, Germany). Sperm motility was assessed by phase-contrast microscopy in a drop of semen on a covered slide at 200x-400x magnification. Two replicate samples were examined to confirm all parameters' readings. Normal values were based on 1999 World Health Organization (WHO) criteria.⁸

Results

Seminal fluid samples collected from 1485 men were analyzed. Age ranged 20-50 (median = 36) years and the duration of infertility ranged 1-5 (median = 3) years. The diagnosis was primary infertility in 683 (46%) patients and secondary infertility in 802 (54%).

According to 1999 WHO reference values for normal semen analysis,⁸ only 61 (4.1%) patients had normal semen parameters. Sperm parameters distribution for study subjects is summarized in Table 1. Azoospermia was encountered in149 subjects (10%), of whom 54 (36%) patients had low ejaculate volume, and 95 (64%) had normal volume. Single factor abnormality was encountered in 783 (52.7%) of screened men; 759 (97%) teratospermia, 16 (2%)

| Findings | Number of patients within the total cohort (%) | Number of patients within subgroups (%) |
|--|--|---|
| Normal seminal parameters | 61 (4.1) | |
| Azoospermia Low volume Normal volume | 149 (10) | 54 (36) 95 (64) |
| Single factor abnormalities Teratospermia Oligospermia Asthenospermia | 783 (52.7) | 759 (97) 16 (2) 8 (1) |
| Two factors abnormalities Oligoteratospermia Teratoasthenospermia Oligoasthenospermia | 289 (19.5) | 133 (46) 95 (33) 61 (21) |
| Oligteratoasthenospermia | 191 (12.9) | |
| Isolated low volume | 12 (0.8) | |
| | | |

| TABLE 2. Oligospermia among 403 Saudi men | | | |
|---|--------------------|----------------------------|--|
| Findings | Number of patients | Percentage of patients (%) | |
| < 5 millions/mL | 25 | 6.1 | |
| 5-10 millions/mL | 165 | 41 | |
| > 10 millions/mL | 213 | 52.9 | |

isolated oligospermia and 8 (1%) asthenospermia. Two factor abnormalities were evident in 289 (19.5%) patients with oligo-teratospermia in nearly half (46%) of them. Combined oligo-astheno-teratospermia was recorded in 191(12.9%) patients. Twelve patients (0.8%) had only isolated low volume ejaculate (less than 1 mL) with no associated other semen abnormalities.

Oligospermia was collectively evident in 403 (27.2%) patients either isolated or combined with other spermogram defect, of whom 25 patients (6.1%) had a sperm concentration less than 5 millions/mL, 165 patients (41%) had sperm concentrations of 5-10 millions/mL, and 213 patients (52.9%) with concentration of more than 10 millions/mL, Table 2.

Discussion

Although conventional semen analysis has been criticized as not a true test of sperm function based on its poor prediction of fertility when compared to more sophisticated tests such as sperm penetration, capacitation, acrosome reaction and, more recently, sperm chromatin structure assay (SCSA) for the detection of DNA integrity,⁹ it provides clues to structural or hormonal dysfunction and it remains the basis of important decisions concerning appropriate treatment.³

Semen analysis of these 1485 males revealed a 95.9% abnormality in at least one factor that could contribute to the couple's subfertility. This is much higher than the 30%-50% contribution of male factor in infertility reported worldwide.^{6,7} Furthermore, Saudi males seem to contribute more to couple subfertility although paradoxically female partners are often blamed and held responsible for that.

In our study, the majority of affected males had only one factor abnormality (52.7%), the most significant being increased abnormal forms (51% of the cohort, and 97% of single factor group). Although we did not record the specific type of abnormality in the morphology of the sperm cells, our result agree with other reports¹⁰⁻¹² that semen of infertile males contain a higher percent of abnormal forms. However, Larry and Stunct¹² reported that morphology results could be affected by staining techniques, subjectivity of observation and the definition of the sperm malfunction. Hence, it may not be a good predictor of the fertility potential of a given semen sample. Conversely, Ugwuja et al¹³ reported 74% abnormal semen parameters in Nigerian infertile males, with asthenospermia being the major sperm defect (70%) attributed to increased genitourinary infections.

Azoospermia is reported in about 2%-5% of all men and is higher in infertile ones.^{14,15} A high incidence of azoospermia at 10% was reported in our study which further calls for more studies to clarify possible etiologies and hence suggest treatment.

The incidence of male infertility differs significantly from one part of the world to another due to several underlying etiological factors, including social habits, genetic causes and environmental conditions such as underlying infections, chemicals, radiation, exposure to heat and frequency of intercourse.¹⁶ The reasons for decline in semen quality of our study cohort are not clear by this study. However, the increase in the incidence of sperm morphological abnormalities in addition to low-sperm count observed in this study indicates qualitative impairment of spermatogenesis which might be due to local rather than global factors.

Our study is limited by selecting male partners of infertile couples who do not represent the general population. Furthermore, no data are available on environmental and occupational factors affecting semen quality as well as smoking, food habits and level of stress in involved men. Also, the study represents only a single center with duration of 3 years. However, multicenter or longer study periods may be influenced by a change in laboratory staff, equipment, and methodology over the period of time.

Conclusions

Ahigh percentage of semen fluid and sperm morphology abnormalities were found in males of infertile couples in Riyadh, Saudi Arabia which may contribute to subfertility. Contribution of male factor to couple infertility in Saudi Arabia is still underestimated. Further studies are needed to address possible etiologies and treatment of oligospermia and teratospermia in our region to improve fertility rates.

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