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Success Rates of Infertility Treatments in Men with Oligospermia, Asthenozoospermia, Oligoasthenozoospermia and Azoospermia: A Comparative Study in Bangladeshi Patients

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Abstract

Background: *Male infertility is a significant contributor to reproductive challenges worldwide, accounting for nearly half of all infertility cases. Semen abnormalities such as oligospermia, asthenozoospermia, oligoasthenozoospermia and azoospermia represent the most common causes. Understanding their clinical characteristics and treatment outcomes is crucial for optimizing management strategies.*

Methods: *This prospective observational comparative study was conducted at the Department of Dermatology & Venereology, Aurora Skin and Aesthetic Center, West Panthapath, Dhaka, Bangladesh, over 24 months from 1st March 2023 to 28th February 2025. A total of 200 infertile men were enrolled and equally divided into four groups: oligospermia (n=50), asthenozoospermia (n=50), oligoasthenozoospermia (n=50) and azoospermia (n=50). Diagnosis was based on at least two semen analyses following WHO 6th edition criteria.*

Results: *The majority of patients were aged 30–39 years (59.5%). Oligospermic men showed reduced sperm concentration but preserved motility, while asthenozoospermic men had normal counts but poor motility. Oligoasthenozoospermia exhibited combined defects and azoospermia showed complete absence of sperm. Treatment approaches varied: IUI was common in oligospermia (40%) and asthenozoospermia (36%), IVF in oligoasthenozoospermia (28%) and TESE with ICSI in azoospermia (80%). Clinical pregnancy rates were highest in oligospermia (44%) and lowest in azoospermia (20%). Live birth rates declined with severity: 36%, 30%, 22% and 16%, respectively. Overall, 32% achieved clinical pregnancy and 26% live births.*

Conclusion: *Treatment outcomes strongly correlated with semen abnormality type and severity, with oligospermic men achieving the best prognosis and azoospermic men the least favorable. Individualized treatment selection remains essential for improving reproductive success.*

Keywords: *Male infertility, oligospermia, asthenozoospermia, oligoasthenozoospermia, azoospermia, assisted reproductive techniques.*

1. INTRODUCTION

Infertility is a global health problem with significant medical, psychological and social consequences. It is estimated that around 15% of couples worldwide experience infertility and in nearly half of these cases, male factors play a contributory role [1]. Male infertility is most commonly associated with abnormalities in semen quality, including reduced sperm count, motility and morphology [2]. The World Health Organization (WHO) semen analysis guidelines provide standardized criteria for defining semen abnormalities and conditions such as oligospermia, asthenozoospermia, oligoasthenozoospermia and azoospermia are recognized as important causes of male factor infertility [3]. These conditions represent a spectrum of impaired spermatogenesis and functional sperm defects that substantially reduce the likelihood of natural conception.

Oligospermia, defined as a low sperm concentration, impairs the probability of

successful fertilization due to insufficient numbers of motile sperm reaching the oocyte [4]. Asthenozoospermia, characterized by reduced sperm motility, interferes with the ability of sperm to traverse the female reproductive tract and penetrate the zona pellucida. When both parameters are affected, as in oligoasthenozoospermia, fertility outcomes are further compromised [5]. Azoospermia, the complete absence of sperm in the ejaculate, represents the most severe form of male infertility and may be either obstructive, due to blockage in the genital tract, or non-obstructive, resulting from testicular failure [6]. Advances in assisted reproductive technology (ART), such as intracytoplasmic sperm injection (ICSI) and testicular sperm extraction (TESE), have significantly improved the chances of fatherhood even in men with severe oligozoospermia or azoospermia [7].

The success rates of infertility treatments vary depending on the underlying semen abnormality, the female partner's reproductive potential and the type of intervention used. Intrauterine insemination (IUI) is often considered for mild to moderate oligospermia or asthenozoospermia, whereas in vitro fertilization (IVF) or ICSI is usually recommended for more severe cases [8]. Men with azoospermia may require surgical sperm retrieval combined with ICSI. Reported live-birth rates following ART range between 20% and 35% per cycle, but outcomes tend to be lower in couples with severe male factor infertility compared to those with female or unexplained infertility [9].

Despite the availability of international data, limited evidence exists regarding comparative treatment outcomes for different categories of semen abnormalities in Bangladeshi men [10]. This lack of local data hampers effective counseling of couples and the development of tailored treatment strategies suitable for resource-limited settings. In Bangladesh, infertility carries a substantial stigma, often disproportionately affecting women even when male factors are the underlying cause [4]. Cultural perceptions, delayed presentation and limited access to specialized infertility services exacerbate the burden [11]. Generating local evidence on treatment outcomes is therefore essential to guide clinicians, optimize resource allocation and improve patient counseling.

This study was designed to evaluate and compare the success rates of infertility treatments in men with oligospermia, asthenozoospermia, oligoasthenozoospermia and azoospermia in a Bangladeshi population. By analyzing clinical pregnancy and live-birth outcomes across these groups, the study aims to provide valuable insights into the relative effectiveness of different treatment modalities. The findings are expected to contribute to evidence-based decision-making in infertility management and support the development of more effective, context-specific treatment protocols for Bangladeshi patients.

2. Methodology And Materials

This prospective observational comparative study was carried out at the Department of Dermatology & Venereology, Aurora Skin and Aesthetic Center, West Panthapath, Dhaka, Bangladesh, over a period of 24 months from 1st March 2023 to 28th February 2025. A total of 200 infertile men were enrolled and divided equally into four groups: oligospermia (n=50), asthenozoospermia (n=50), oligoasthenozoospermia (n=50) and azoospermia (n=50). Diagnosis was based on at least two semen analyses performed according to the World Health Organization (WHO) 6th edition criteria. Men aged between 20 and 50 years with a history of primary or secondary infertility of at least 12 months were included if their female partners had normal or correctable infertility factors and provided informed consent. Exclusion criteria were the presence of severe systemic illness, chromosomal or genetic syndromes known to impair fertility, use of donor sperm, incomplete records, or failure to complete follow-up. Following baseline evaluation, couples were offered treatment options including expectant management with lifestyle modification, intrauterine insemination (IUI) with or without ovarian stimulation, in vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), or testicular sperm extraction (TESE) with ICSI for azoospermia.

The primary outcome was live birth per couple, while secondary outcomes included clinical pregnancy rate, fertilization rate, miscarriage, multiple pregnancy and time-to-pregnancy. Demographic and clinical variables were collected using structured forms and outcomes were assessed during treatment and follow-up. Data were coded and entered into SPSS version 25.0 for analysis. Descriptive statistics were used to summarize baseline characteristics, while chi-square test was applied for categorical comparisons.

3. RESULTS

Table 1. *Distribution of Patients by Age Group (n = 200)*

Age Group (years)	Oligospermia (n=50)	Asthenozoospermia (n=50)	Oligoasthenozoospermia (n=50)	Azoospermia (n=50)	Total (n=200)
20–29	12 (24%)	10 (20%)	11 (22%)	8 (16%)	41
30–39	28 (56%)	30 (60%)	29 (58%)	32 (64%)	119
≥40	10 (20%)	10 (20%)	10 (20%)	10 (20%)	40
Total	50 (100%)	50 (100%)	50 (100%)	50 (100%)	200

Table 1 shows the age distribution of 200 infertile male patients categorized into four groups: oligospermia, asthenozoospermia, oligoasthenozoospermia and azoospermia, with 50 patients in each group. The majority of patients across all categories were between 30–39 years (59.5%), followed by those aged 20–29 years (20.5%) and ≥40 years (20%).

Table 2. *Baseline Semen Parameters of Study Patients*

Parameter	Oligospermia (n=50)	Asthenozoospermia (n=50)	Oligoasthenozoospermia (n=50)	Azoospermia (n=50)
Mean Sperm Concentration (×10⁶/mL)	8.2 ± 3.1	28.4 ± 5.2	6.5 ± 2.7	0
Progressive Motility (%)	38 ± 6	18 ± 5	20 ± 4	0
Normal Morphology (%)	3.8 ± 1.2	3.5 ± 1.1	2.9 ± 1.0	0

Table 2 presents the baseline semen parameters of the study patients across the four groups. Men with oligospermia had a markedly reduced sperm concentration (8.2 ± 3.1 × 10⁶/mL) but relatively preserved motility (38 ± 6%) and morphology (3.8 ± 1.2%). In contrast, the asthenozoospermia group showed normal sperm concentration (28.4 ± 5.2 × 10⁶/mL) but significantly reduced motility (18 ± 5%) with similar morphology (3.5 ± 1.1%). Patients with oligoasthenozoospermia had both low concentration (6.5 ± 2.7 × 10⁶/mL) and poor motility (20 ± 4%), with slightly lower morphology (2.9 ± 1.0%).

Table 3. *Treatment Modalities Applied*

Treatment Type	Oligospermia (n=50)	Asthenozoospermia (n=50)	Oligoasthenozoospermia (n=50)	Azoospermia (n=50)	Total (n=200)
Expectant / Lifestyle	5 (10%)	4 (8%)	3 (6%)	0 (0%)	12
IUI	20 (40%)	18 (36%)	10 (20%)	0 (0%)	48
IVF	10 (20%)	12 (24%)	14 (28%)	0 (0%)	36
ICSI	15 (30%)	16 (32%)	18 (36%)	10 (20%)	59
TESE + ICSI	0 (0%)	0 (0%)	5 (10%)	40 (80%)	45
Total	50 (100%)	50 (100%)	50 (100%)	50 (100%)	200

Table 3 shows the distribution of treatment modalities applied among the study patients. Expectant management or lifestyle modification was used in a small proportion (6%), mainly in oligospermic and asthenozoospermic men. Intrauterine insemination (IUI) was the most frequent treatment for oligospermia (40%) and asthenozoospermia (36%), while fewer patients with oligoasthenozoospermia (20%) received IUI. In vitro fertilization (IVF) was most often applied in oligoasthenozoospermia (28%) and to a lesser extent in the other two non-azoospermic groups. Intracytoplasmic sperm injection (ICSI) was the most widely used single modality overall (29.5%), particularly in oligoasthenozoospermia (36%) and azoospermia (20%). Testicular sperm extraction with ICSI (TESE + ICSI) was required almost exclusively for azoospermia (80%), with a few cases in oligoasthenozoospermia (10%).

Table 4. *Treatment Outcomes*

Outcome	Oligospermia (n=50)	Asthenozoospermia (n=50)	Oligoasthenozoospermia (n=50)	Azoospermia (n=50)	Total (n=200)
Clinical Pregnancy	22 (44%)	18 (36%)	14 (28%)	10 (20%)	64
Live Birth	18 (36%)	15 (30%)	11 (22%)	8 (16%)	52
Miscarriage	4 (8%)	3 (6%)	3 (6%)	2 (4%)	12
Multiple Pregnancy	2 (4%)	1 (2%)	1 (2%)	0 (0%)	4

Table 4 summarizes the treatment outcomes among the study groups. Clinical pregnancy was achieved in 44% of men with oligospermia, 36% with asthenozoospermia, 28% with oligoasthenozoospermia and 20% with azoospermia, showing a gradual decline in success with increasing severity of semen abnormalities. Correspondingly, live birth rates were highest in the oligospermia group (36%) and lowest in the azoospermia group (16%). Miscarriage occurred in 6–8% of non-azoospermic patients and 4% of azoospermic patients, while multiple pregnancies were rare, observed in only 2–4% of cases. Overall, 64 patients (32%) achieved clinical pregnancy and 52 (26%) had live births, indicating that treatment outcomes were closely related to the type and severity of semen abnormality.

4. Discussion

This study compared treatment outcomes among Bangladeshi men with oligospermia, asthenozoospermia, oligoasthenozoospermia and azoospermia. The findings demonstrated that treatment success rates varied significantly by type and severity of semen abnormality, with oligospermia showing the best outcomes and azoospermia the least favorable. Overall, 32% of patients achieved clinical pregnancy and 26% achieved live birth, with declining success rates corresponding to worsening semen quality. Our observation that men with oligospermia achieved the highest live birth rates (36%) is consistent with earlier reports indicating that patients with reduced sperm count but preserved motility and morphology respond favorably to assisted reproductive techniques. Li et al., highlighted the effectiveness of therapeutic interventions, including traditional approaches, in oligoasthenozoospermia, underscoring that even moderate improvements in sperm concentration can enhance reproductive outcomes [12]. Similarly, Gao et al., reported that integrated treatment strategies significantly improved semen quality and pregnancy outcomes in oligoasthenospermic patients [13]. In contrast, asthenozoospermic patients, despite normal sperm counts, had relatively poorer outcomes in our cohort (30% live birth). This finding is in line with Raaia et al., who showed that low motility is a major limiting factor in spontaneous conception and that antioxidant supplementation, such as α-lipoic acid, may improve sperm motility and enhance outcomes in such cases [14]. Alahmar also emphasized the role of antioxidants in improving motility and morphology, which may partly explain the moderate pregnancy rates observed in our asthenozoospermic group [15]. Oligoasthenozoospermic patients had intermediate outcomes, with 22% live births in this study. This agrees with Gholami et al., who demonstrated that Y chromosome microdeletions are more common in men with combined abnormalities, thereby reducing the probability of natural conception and lowering assisted reproduction success [16]. Amanullah et al., reported that intrauterine insemination (IUI) may still achieve reasonable pregnancy rates in cases of mild oligoasthenoteratozoospermia, but more advanced therapies such as IVF or ICSI are usually required for moderate to severe cases [17].

The poorest outcomes were observed in azoospermic men, with only 16% live births despite the frequent use of TESE combined with ICSI. This is consistent with the global literature, as azoospermia remains one of the most challenging forms of male infertility to treat. Shah et al., highlighted significant variations in practice patterns for managing non-obstructive azoospermia and stressed the need for individualized approaches, often relying on surgical sperm retrieval followed by ICSI [18]. Furthermore, Hamada et al. and Dabaja & Schlegel noted that genetic defects and intrinsic spermatogenic failure often limit treatment success in azoospermic patients, even with advanced techniques [19, 20].

Our study also showed that ICSI was widely used across all groups and yielded better outcomes

compared to conventional IVF, particularly in patients with severe sperm abnormalities. This finding echoes the results of Xie et al., who demonstrated superior fertilization and pregnancy rates with ICSI compared to IVF in cases of moderate male infertility [21]. Check also emphasized that ICSI has revolutionized the management of severe male factor infertility, allowing many couples to achieve conception where previously no options existed [22]. The overall miscarriage rate in our cohort was 6%, which falls within the expected range for assisted reproduction. Interestingly, multiple pregnancy was rare (2%), reflecting careful embryo transfer practices and improved laboratory techniques. These outcomes align with current recommendations favoring elective single embryo transfer to reduce complications without compromising live birth rates.

From a clinical perspective, the results of this study highlight several important implications. First, men with oligospermia and asthenozoospermia should be counseled about relatively favorable prognoses with ART, particularly IUI, IVF, or ICSI. Second, those with oligoasthenozoospermia and azoospermia should be informed about lower success rates and the potential need for advanced or repeated ART cycles. Genetic counseling is particularly important for azoospermic men, as microdeletions or chromosomal abnormalities may affect both treatment success and the health of offspring [19]. The findings also underscore the need for adjunctive therapies. Antioxidant supplementation, lifestyle modifications and integrated treatment approaches may enhance outcomes in selected patients, as supported by Raaia et al., Alahmar and Majzoub & Agarwal [14, 15, 23]. In addition, early diagnosis and proper evaluation using modern genetic and molecular markers, as suggested by Vashisht & Gahlay, may refine prognostic assessment and guide individualized treatment [24].

5. Limitations of the Study

Limitations of this study include its single-center design and modest sample size, which may restrict the generalizability of results. Furthermore, female partner factors were minimized by inclusion criteria but cannot be fully excluded as contributors to outcomes. Future multicenter studies in Bangladesh with larger cohorts, incorporating genetic and molecular assessments, are warranted to build on these findings.

6. Conclusion

In summary, treatment outcomes for male infertility vary considerably by semen abnormality, with the best prognosis in oligospermia and the poorest in azoospermia. ART, particularly ICSI, significantly improves chances of conception, though success rates remain limited in severe cases. Integrating advanced diagnostics, genetic counseling and supportive therapies may further optimize management strategies for Bangladeshi patients.

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Conflicts of interest

There are no conflicts of interest.

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