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## INSIGHTS INTO MALE INFERTILITY MANAGEMENT: EXPERT OPINION AND PRACTICES AMONG LEADING GYNECOLOGISTS IN INDIA

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**ABSTRACT: Background:** Male infertility is a significant, yet often overlooked, contributor to couple infertility, particularly in developing countries. Social stigma, cultural barriers, and lack of comprehensive data on male infertility further exacerbate the issue, making it challenging to address effectively. **Aims and Objectives:** This study aimed to evaluate the current clinical practices, diagnostic approaches, and management strategies for male infertility among gynecologists in India. **Materials and Methods:** A comprehensive survey was conducted during the 19th Annual Conference of the Indian Fertility Society (IFS), FERTIVISION-2023. A total of 1039 gynecologists from various regions of India participated. The survey comprised 11 key questions focusing on primary and secondary causes of male infertility, diagnostic practices, semen analysis, and management strategies including the use of antioxidants, clomiphene, and varicocele repair. **Results:** The survey revealed that 43.12% of clinicians reported 10-20% of their male patients had fertility issues. Premature ejaculation (51.11%) and erectile dysfunction (34.55%) were the most common sexual dysfunctions observed. Semen analysis was routinely performed by 16.65% of respondents, and 54.09% referred patients to urologists for varicocele management. Antioxidants were prescribed based on semen analysis by 35.32% of clinicians. Notably, northern India reported the highest prevalence of male infertility. **Conclusion:** The survey highlights significant variations in the diagnosis and management of male infertility across different regions in India. Social stigma and cultural barriers significantly impact the accurate reporting and management of male infertility. These findings underscore the need for standardized diagnostic protocols, increased awareness, and comprehensive training for healthcare providers in India.

**INTRODUCTION:** Infertility, characterized by the inability to achieve clinical pregnancy despite regular unprotected sexual intercourse for at least one year, as defined by the International Committee for Monitoring Assisted Reproductive Technology and the World Health Organization (WHO)<sup>1,2</sup>, and affects approximately one-in-six couples worldwide, during their reproductive lifetime<sup>3</sup>. With more than 80 million couples grappling with infertility globally<sup>4</sup>, it presents a significant public health concern.

Male infertility, a subset of infertility, refers to the inability of a male to impregnate a fertile female, often attributed to abnormalities in semen quality such as alterations in sperm counts, concentration, motility, and morphology observed in at least one sample out of two sperm analyses conducted one and four weeks apart<sup>5</sup>. This issue remains controversial globally, influenced by a multitude of factors such as psychological, economic, and social dynamics set-up<sup>6,7</sup>.

Over the past few decades, the prevalence of male infertility has been on the rise globally, with estimates ranging from 20% to 70%<sup>8,9</sup>. Notably, the male partner is solely responsible for infertility in 20%–30% of cases and contributes to couple infertility in approximately 50% of cases.<sup>7</sup> In developing countries like ours (India), where the

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overall prevalence of primary infertility ranges between 3.9% and 16.8%<sup>10</sup>, regional variations further complicate the landscape. Disparities in infertility rates exist not only between states, but also within communities, tribes, and castes<sup>11-14</sup>.

The etiology of male infertility encompasses a broad spectrum of factors, including genetic predispositions, varicocele, reproductive or urinary tract infections or inflammation, smoking, endocrine abnormalities, cryptorchidism, medication usage, malignancy, radiation, chemotherapy, environmental exposures, underlying medical comorbidities and lifestyle factors<sup>15</sup>. Oxidative stress, an environmental factor, arising from an imbalance between reactive oxygen species production and antioxidant defense mechanisms, has also emerged as a significant contributor to male infertility<sup>16, 17</sup>. These factors are believed to be contributing to rising global incidence of male infertility. Despite the multifaceted nature of male infertility, a considerable portion of cases remain unexplained or idiopathic<sup>15</sup>.

In India, there exists a significant disparity in the attention given to female infertility compared to male infertility. This discrepancy is largely due to cultural factors, including entrenched notions of masculinity and power dynamics within relationships. In many rural areas, male factor issues, such as ego and a desire to control female, often overshadow discussions about male infertility. Additionally, there is a tendency to assign blame to females for infertility issues in uneducated families, further marginalizing the consideration of male reproductive health. Moreover, there is a notable lack of awareness and understanding surrounding male fertility, both among healthcare professionals and the general public. This knowledge gap hinders efforts to improve treatment outcomes for infertile male patients. To address this challenge effectively, it is essential to delve into the root causes of male infertility and explore the available treatment options. However, progress in this field is hindered by a lack of opinion and consensus among experts regarding the diagnosis and treatment of male reproductive dysfunction, as highlighted by several researchers<sup>2, 6</sup>. Overcoming these barriers is crucial for advancing our understanding of male infertility

and enhancing patient care in this domain. To address this gap and foster collaboration among gynecologists, andrologists, and urologists, a panel of experts convened at the 19th Annual Conference of the Indian Fertility Society (IFS), FERTIVISION-2023, held in Delhi NCR, India, from December 8-10, 2023. With a theme of "Enhancing Quality in Assisted Reproductive Technology (ART)," the meeting aimed to assess the awareness and understanding of male infertility among gynecologists, explore the limitations of conventional ART in managing male infertility, and provide expert insights on diagnosis, management, and potential advancements in male infertility based on both published evidence and clinical experience, ultimately improving outcomes for affected individuals and couples. In an effort to provide a more comprehensive understanding, we conducted a questionnaire-based survey aimed at capturing insights into the delivery of clinical care and the prevailing professional opinions among specialist clinicians operating in male infertility settings.

**MATERIALS AND METHODS:** A survey conducted during the 19<sup>th</sup> Annual conference of the Indian Fertility Society (IFS), FERTIVISION-2023, was moderated by panel/team of eminent gynecologists including Dr. Kanad D. Nayar, Dr. Surveen Ghumman, Dr. Pankaj Talwar and Dr. Neena Malhotra with Dr. M. Venugopal as a survey in-charge, and Dr. Shalini Chawla Khanna as a survey co-ordinator. A total of 1039 gynecologists participated in the survey, which focused on assessing knowledge about primary and secondary causes of male infertility, awareness of fertility preservation techniques, identification of barriers to fertility preservation and current treatment options.

The questionnaire included 11 key questions covering aspects such as the percentage of male patients seen, methods of patient evaluation, semen sampling, analysis and culture, investigations beyond semen analysis, techniques to deal with varicocele, common sexual dysfunctions diagnosed, and decisions regarding antioxidant and clomiphene prescriptions. It was prepared based on the available published data and suggestions from experts in the field. The panel discussed prevalent clinical practices in male fertility care and limitations of conventional ART based on currently

available evidence and their own experience, followed by the circulation of questionnaires to all participated gynecologist for discussion and voting to elicit their expert opinion, during the conference. The details of the questions asked and the experts' opinions with available evidence are summarized below. In summary, the survey aimed to provide insights into the current landscape of male infertility management among gynecologists, facilitating the development of targeted programs to enhance care and counseling in this area.

**RESULTS AND DISCUSSION:** A total of 1039 gynecologists, representing diverse geographical regions across India, including Northern, Southern, Eastern, Western, and Central areas, responded at the end of the survey. The distribution of respondents across these regions was as follows: North (n=606, 58.33%), South (n=166, 15.98%), East (n=120, 11.55%), West (n=103, 9.91%), and Central (n=44, 4.23%). This geographical diversity ensures a comprehensive representation of perspectives and practices in the field of male infertility management across India. The survey findings shed light on various aspects of male infertility management among gynecologists across different regions of India. The results of present survey provide valuable insights into the current clinical practices and perspectives of gynecologists regarding male infertility management in India.

The prevalence of male infertility among Indian couples seeking treatment is estimated to be around 15-23%. However, obtaining precise rates in developing countries like ours poses challenges due to various factors. These include ambiguities in defining male infertility, underreporting issues, and societal stigmas prevalent in semi-urban and rural areas. In these communities, there is often a tendency to assign blame to women for infertility issues, while men may hesitate to seek assessment due to factors such as ego and societal pressures<sup>18</sup>. To address this complexity and gain a more accurate understanding, reproductive specialists were surveyed regarding the percentage of male patients presenting with fertility-related issues in their infertility practices. This approach aimed to provide insights into the true extent of male infertility cases, which may not be fully reflected in reported statistics. To gain a comprehensive understanding of male infertility prevalence and its

impact on Indian couples seeking treatment, the survey question initiated with an inquiry into the percentage of male patients presenting with fertility-related issues in the infertility practices of reproductive specialists (gynecologists).

Herein, the survey revealed that 43.12% of specialists reported encountering fertility-related issues in 10-20% of male patients within their infertility practices. Furthermore, the distribution of responses among specialists regarding the percentage of male patients with fertility-related issues varied as follows: 8.66% of respondents noted that less than 10% of male patients were affected, accounting for 90 participants. For 21% to 35% of male patients, 23.87% of specialists reported encountering fertility-related issues, with 248 respondents sharing this observation.

Similarly, in the case of 36% to 50% of male patients, 19.06% of specialists indicated experiencing fertility-related issues, with a total of 198 respondents supporting this perspective. Moreover, 5.20% of specialists reported that over half (>50%) of male patients exhibited fertility-related issues, representing 54 respondents. Interestingly, a minute fraction of specialists (0.10%) observed fertility-related issues in less than 5% of male patients, with only one respondent expressing this viewpoint **Table 1**. These findings provide valuable insights into the prevalence of male infertility issues within infertility practices, reflecting the varying degrees of impact across different patient populations and clinical settings. Despite the imperative to ascertain precise rates of male infertility in developing nations such as ours, challenges persist due to inherent ambiguities in defining male infertility and deficiencies in accurate reporting mechanisms. Consequently, existing data may not fully reflect the true prevalence of male infertility. Nonetheless, future research endeavors hold promise in elucidating the primary etiological factors contributing to male infertility. By undertaking comprehensive research studies, we can discern the underlying causes of male infertility and endeavor to mitigate the impact of factors detrimental to male fertility. This proactive approach is essential for safeguarding the reproductive health and fertility potential of males in the years ahead.

**TABLE 1: PERCENTAGE OF MALE WITH INFERTILITY RELATED ISSUE**

| <b>Que 1: What percentage male patients in your infertility practice have fertility related issues?</b> |                        |                     |
|---|------------------------|---------------------|
| <b>Answer</b>   | <b>No. of Response</b> | <b>% Respondent</b> |
| 10 to 20%   | 448                    | 43.12               |
| 21 to 35%   | 248                    | 23.87               |
| 36 to 50%   | 198                    | 19.06               |
| <10%  | 90                     | 8.66                |
| >50%  | 54                     | 5.2                 |
| <5%   | 1                      | 0.1                 |

Turning our attention to the evaluation practices for male patients, we next sought insights from respondents regarding their typical approaches. In response to inquiries regarding routine evaluation methods for male patients, our survey revealed diverse practices among respondents. Specifically, 38.11% of respondents indicated that male patients were typically evaluated by in-house andrology or urology specialists, while 30.22% reported referral to nearby specialists for evaluation. Conversely, a minimal proportion (15.01%) of male patients were

solely self-evaluated. Interestingly, a comparable percentage (16.65%) of gynecology specialists reported routinely conducting semen analysis for male infertility assessment **Table 2**. Alarming, none of the respondents reported employing either local or physical examinations or obtaining brief or detailed medical histories of male patients as routine evaluation methods for male infertility. This highlights a concerning gap in clinical practice, necessitating attention and improvement in evaluation protocols for male infertility.

**TABLE 2: PREFERENCE METHOD FOR INFERTILITY EVALUATION**

| <b>Que 2: What is your preferred method of evaluation of male partner?</b> |                        |                     |
|--|------------------------|---------------------|
| <b>Answer</b>  | <b>No. of Response</b> | <b>% Respondent</b> |
| In-house andrologist/ urologist  | 396                    | 38.11               |
| Referral to nearby andrologist/urologist                                   | 314                    | 30.22               |
| Only get semen analysis done - No local examination                        | 173                    | 16.65               |
| Self-evaluation  | 156                    | 15.01               |

Initiating the next question, we inquired about the preferred methods for conducting semen analysis, recognizing its significance in infertility investigations. Despite the critical role of semen analysis in infertility assessments, our findings revealed that only 16.65% of clinicians utilized this technique for male infertility evaluation. This limited utilization may be attributed to the nascent stage of laboratory semenology and the scarcity of adequately trained staff<sup>19, 20</sup>. In response to this observed deficit, we proceeded to inquire about clinicians' preferences regarding the way of semen analysis in term of personnel. Our investigation uncovered that a majority of clinicians (42.06%) expressed a preference for utilizing their own technicians, trained under in-house andrologists or semenologists, for conducting semen analysis. In instances where trained personnel were unavailable, 30.22% of clinicians opted to refer patients to reputable standardized laboratories. Additionally, 26.18% indicated a preference for conducting semen analysis using laboratory personnel with Diploma in Medical Laboratory

Technology (DMLT) within their own facilities. Interestingly, a mere 1.54% of clinicians favoured utilizing locally available laboratories for semen analysis. These findings shed light on the varied preferences and practices regarding semen analysis among gynecological specialists, emphasizing the need for standardized protocols and access to trained personnel in Semenology **Table 3**. Continuing our exploration into seminal analysis techniques, we then turn our attention towards the practice of semen culture, an essential component of male fertility evaluation. The semen culture test stands as a critical component in the assessment of male infertility, serving to identify reproductive or urinary tract infections that may compromise sperm function. By offering insights into semen quality and guiding appropriate treatment strategies, it significantly contributes to enhancing fertility outcomes. Furthermore, its role extends to the prevention of infection transmission and ensures a comprehensive evaluation of male fertility factors<sup>21</sup>. To ascertain the prevalence of semen culture utilization among gynecologists, we posed the

question regarding their practice of obtaining semen cultures. Our findings revealed that more than 50% of gynecologists preferred to recommend semen culture when observing round cells during semen analysis, while 25.12% of clinicians

advocated for it before *in-vitro* Fertilization (IVF) procedures. Surprisingly, a notable 9.24% of specialists reported refraining from semen culture testing, citing a lack of necessity for such assessments **Table 3**.

**TABLE 3: CLINICIANS' PREFERENCE FOR SEMEN ANALYSIS AND ITS CULTURE**

| <b>Que 3: How do you prefer to get Semen Analysis done?</b>     |                        |                     |
|---|------------------------|---------------------|
| <b>Answer</b>   | <b>No. of Response</b> | <b>% Respondent</b> |
| Own laboratory with technician trained in andrology /Semenology | 437                    | 42.06               |
| Refer to nearby reputed standardized laboratory                 | 314                    | 30.22               |
| Own laboratory with DMLT person                                 | 272                    | 26.18               |
| Refer to nearest available laboratory                           | 16                     | 1.54                |
| <b>Que 4: Do you get a semen culture?</b>                       |                        |                     |
| Only if round cells in semen analysis                           | 530                    | 51.01               |
| Before IVF always   | 261                    | 25.12               |
| As a routine  | 152                    | 14.63               |
| Never get it done as not needed                                 | 96                     | 9.24                |

In order to gain insight into the extent of investigations beyond semen analysis in the evaluation of male infertility, we posed the question: "What percentage of your male infertility patients require investigation beyond semen analysis?" In our investigation into the necessity of investigations beyond semen analysis in male infertility cases, we found varied approaches among respondents. Notably, a mere 1.25% of clinicians (n=13) indicated never preferring investigations beyond semen analysis, relying solely on physical examination for diagnosing male infertility. Conversely, the majority (37.63%) of clinicians routinely recommended investigations

beyond semen analysis for 5-10% of their male infertility patients to confirm diagnoses. Additionally, 28.97% of specialists reported suggesting investigations beyond semen analysis for 11-20% of their patient population. Interestingly, only a small fraction (3.85%) of infertility specialists (n=40) indicated a preference for routinely conducting investigations beyond semen analysis in all visited patients **Table 4**. These findings highlight the diverse practices and considerations among clinicians regarding the need for investigations beyond semen analysis in male infertility assessments.

**TABLE 4: PERCENTAGE OF PATIENT NEED INVESTIGATION BEYOND SEMEN ANALYSIS**

| <b>Que 5: What percentage of your male infertility patients need investigations beyond Semen analysis?</b> |                        |                     |
|--|------------------------|---------------------|
| <b>Answer</b>  | <b>No. of Response</b> | <b>% Respondent</b> |
| 5-10 %   | 391                    | 37.63               |
| 11-20%   | 301                    | 28.97               |
| Less than 5%   | 164                    | 15.78               |
| 21-35%   | 130                    | 12.51               |
| Most patients  | 40                     | 3.85                |
| Never send investigations beyond semen analysis  | 13                     | 1.25                |

Given the profound psychological impact of infertility and its potential contribution to sexual dysfunction, understanding the prevalence of such issues in male infertility becomes imperative. Erectile dysfunction and premature ejaculation, among the primary manifestations of male infertility-related sexual dysfunction, not only serve as indicators of overall health but are also sometimes associated with cardiovascular and various other medical conditions, both cancerous

and non-cancerous. Thus, it becomes essential to ascertain the most prevalent form of sexual dysfunction commonly encountered in male infertility cases<sup>22</sup>. In pursuit of this understanding, clinicians were queried/asked regarding the commonest sexual dysfunction observed in patients during the evaluation of male infertility. The survey findings unveiled that premature ejaculation emerged as the most prevalent sexual dysfunction among patients undergoing evaluation for male

infertility, as reported by 51.11% of respondents. Following closely behind was erectile dysfunction, cited by 34.55% of respondents. A smaller subset of respondents' highlighted issues related to sexual orientation or preference (8.08%), while a minority (6.26%) cited other sexual dysfunctions **Table 5**. These results emphasize the significance of addressing premature ejaculation and erectile dysfunction in the assessment and treatment of male infertility, emphasizing the necessity for thorough sexual health evaluations within this patient demographic. Continuing our exploration of factors influencing male infertility, varicocele emerges as a common concern among affected individuals (Expanding our inquiry into male infertility, varicocele emerges as a prevalent issue among affected individuals). Varicocele repair (VR) is often undertaken to enhance semen parameters and increase the likelihood of

conception. However, the lack of consensus on varicocele diagnosis and management poses a challenge<sup>23</sup>. With this in mind, the objective of the circulated question was to investigate global practice patterns concerning varicocele management within the realm of male infertility. The results revealed that the majority of gynecologists (54.09%) indicated a routine practice of referring patients to urologists for determining the optimal procedure on a case-by-case basis. Additionally, 21.37% of clinicians advocated for minimizing surgical interventions, citing perceived ineffectiveness. Furthermore, 18.86% of respondents endorsed individualized management strategies informed by existing literature. Conversely, a minority of survey participants (5.68%) favoured making decisions based solely on ultrasound findings **Table 5**.

**TABLE 5: PREVALENCE OF MOST COMMONLY OBSERVED SEXUAL DYSFUNCTION AND PREFERRED WAY TO DEAL WITH VARICOCELES AMONG INFERTILE MALE**

| <b>Que 6: During evaluation of male which is the commonest sexual dysfunction patients reveal?</b> |                        |                     |
|--|------------------------|---------------------|
| <b>Answer</b>  | <b>No. of Response</b> | <b>% Respondent</b> |
| Premature Ejaculation  | 531                    | 51.11               |
| Erectile dysfunction   | 359                    | 34.55               |
| Sexual Orientation/preference related issues   | 84                     | 8.08                |
| Others   | 65                     | 6.26                |
| <b>Que 7: Your preferred way of dealing with Varicoceles in infertile males</b>                    |                        |                     |
| Refer to urologist to decide best  | 562                    | 54.09               |
| Avoid surgery as far as possible as it does not change parameters much                             | 222                    | 21.37               |
| Individualize management based on literature   | 196                    | 18.86               |
| Decision according to ultrasound finding   | 59                     | 5.68                |

The etiology and risk factors contributing to male infertility are multifaceted, encompassing a range of genetic and acquired causes such as varicocele, reproductive tract infections/inflammation, endocrine abnormalities, cryptorchidism, medications, malignancy, radiation and chemical or chemotherapy exposure, environmental and lifestyle factors, and underlying medical comorbidities.<sup>24</sup> Despite the extensive array of potential causes discussed earlier in the introduction section, a considerable portion of male infertility cases remain categorized as unexplained male infertility (UMI) and/or idiopathic male infertility (IMI). In this context, oxidative stress (OS) has emerged as a significant etiological factor and/or common mechanism underlying many known and unknown causes of male infertility. OS arises from an imbalance between reactive oxygen species (ROS) and antioxidants, culminating in

sperm DNA fragmentation (SDF) and semen abnormalities<sup>25</sup>. Given the prominence of OS as a cause or mechanism of certain form of male infertility, the use of antioxidants to mitigate seminal ROS represents a crucial therapeutic option aimed at improving semen parameters and fertility. However, in the contemporary era of evidence-based medicine (EBM), there exists limited information regarding the utilization of antioxidants in clinical practice for male infertility, leading to uncertainty among clinicians regarding the appropriate timing for antioxidant prescription<sup>24, 25</sup>. To address this discrepancy, a comprehensive question was asked to reproductive specialists to ascertain the pattern of antioxidant prescriptions. Respondents were queried about the basis upon which they decide to prescribe antioxidants in male infertility, with five options provided: based on semen analysis, subnormal semen parameters with

the presence of additional stress markers, only after DNA fragmentation assay, universally prescribed, or abstention from prescribing antioxidants altogether. Continuing our investigation into the utilization of antioxidants in male infertility treatment, we examine the basis upon which clinicians prescribe these therapeutic agents. Herein, a significant proportion of clinicians (35.32%) endorse antioxidants as a therapeutic option based solely on semen analysis, while a comparable 31.95% prescribe them in response to subnormal semen parameters. Interestingly,

17.81% of gynecologists opt for antioxidant supplementation regardless of specific parameters, considering it as an add-on therapy or health supplement. Notably, only 12.03% of specialists administer antioxidant therapy following DNA fragmentation testing. Conversely, a minority (2.89%) of doctors refrain from prescribing antioxidants altogether **Table 6**. These findings shed light on the varied approaches clinicians employ in determining the appropriate timing and criteria for antioxidant prescription in male infertility management.

**TABLE 6: PREFERRED WAY OF DEALING WITH MALE INFERTILITY USING ANTIOXIDANTS OR CLOMIPHENE ALONG WITH INCIDENCE OF AZOOSPERMIA AMONG INFERTILE MALE**

| <b>Que 8: Your decision to prescribe antioxidants in male is based on</b>                        |                        |                     |
|--|------------------------|---------------------|
| <b>Answer</b>  | <b>No. of Response</b> | <b>% Respondent</b> |
| Semen analysis alone   | 367                    | 35.32               |
| Subnormal semen parameters with presence of additional stressors like accessory gland infections | 332                    | 31.95               |
| Universal prescription   | 185                    | 17.81               |
| Only after special tests like DNA Fragmentation Assays   | 125                    | 12.03               |
| Do not give antioxidants   | 30                     | 2.89                |
| <b>Que 9: What is the incidence of azoospermia in your practice among infertile men?</b>         |                        |                     |
| Between 2-5%   | 391                    | 37.63               |
| 1-2%   | 312                    | 30.03               |
| Between 5-10%  | 196                    | 18.86               |
| Less than 1%   | 102                    | 9.82                |
| >10%   | 38                     | 3.66                |
| <b>Que 10: Do you give clomiphene to men who are infertile?</b>                                  |                        |                     |
| Only those with severe oligoteratozoospermia   | 373                    | 35.9                |
| All those with any abnormal semen parameters   | 343                    | 33.01               |
| Always as a routine  | 176                    | 16.94               |
| Not at all   | 147                    | 14.15               |

Amidst our exploration of the various causes of male infertility, it is crucial to acknowledge the significance of azoospermia, one of the major cause of infertility in male. Azoospermia, characterized by the absence of sperm in ejaculate, stands as a profound challenge to male fertility, greatly impacting the prospects of natural conception for couples. Recognizing the incidence of azoospermia among infertile males holds paramount importance, as it informs resource allocation and treatment strategies tailored to individual needs<sup>26</sup>. Moreover, understanding its prevalence aids in uncovering underlying factors, be it genetic disorders or obstructive conditions, necessitating specialized interventions. Therefore, an accurate assessment of azoospermia incidence is essential for optimizing patient care and reproductive outcomes<sup>27</sup>. Furthermore, it is imperative to address the common misconception that infertility

predominantly stems from female factors, neglecting the substantial impact on male fertility. Effective management of azoospermia demands a comprehensive grasp of its etiology and incidence rate<sup>26</sup>. However, the lack of available data and knowledge among clinicians underscores the importance of understanding the prevalence of azoospermia among infertile males. To confront these challenges, clinicians were surveyed regarding the incidence of azoospermia among infertile men in their clinical practice. The survey revealed that 37.63% of clinicians reported an incidence of azoospermia ranging from 2-5% among their infertile patients, visiting the clinics. This suggests that approximately 2-5% of diagnosed infertile males in their clinics are affected by azoospermia. Additionally, 30.03% of clinicians reported an incidence between 1-2%, while 18.86% reported an incidence ranging from

5-10%. A smaller subset of clinicians, comprising 9.82% and 3.66%, reported incidences of less than 1% or greater than 10%, respectively **Table 6**. These findings underscore the significant impact of azoospermia on male infertility and emphasize the necessity of addressing this condition in clinical practice.

As discussed, male infertility is a complex condition often influenced by hormonal factors. Clomiphene, a selective estrogen receptor modulator (SERM), is commonly used to stimulate gametogenesis by increasing pituitary gonadotrophic hormone secretion, particularly gonadotropin-releasing hormone (GnRH). Despite its ability to potentially improve sperm count, clomiphene treatment is considered off-label due to its paroxysmal effects, necessitating careful consideration<sup>28, 29</sup>. In light of these considerations, we sought to evaluate clinicians' preferences regarding the use of clomiphene in male infertility treatment. Survey data was gathered to assess the frequency and rationale behind clomiphene administration in infertile men, aiming to provide insights into its efficacy and safety profile. While the findings may support the use of clomiphene in male infertility management, it is imperative to thoroughly discuss potential side effects with patients. The survey results indicated that 16.94% of experts routinely administer clomiphene to infertile men. Additionally, 33.01% prescribe clomiphene to all men exhibiting abnormal semen parameters, while 35.90% reserve its use for those with severe oligoteratozoospermia. Interestingly, the distribution of responses among these categories is relatively similar. However, 14.15% of respondents refrain from prescribing clomiphene to infertile men altogether **Table 6**. These findings highlight/suggest/underscore the diverse approaches adopted by experts in utilizing clomiphene for male infertility treatment. While a significant proportion considers it for patients with abnormal semen parameters, particularly severe oligoteratozoospermia, clear communication regarding potential side effects is essential when considering clomiphene therapy.

To conclude the survey, clinicians were asked to indicate their region of practice within India. This inquiry was prompted (came into mine) due to the substantial variability in infertility rates among

Indian states, ranging from 3.7% in regions such as Uttar Pradesh, Himachal Pradesh, and Maharashtra, to 5% in Andhra Pradesh, and up to 15% in Kashmir. Additionally, variations in primary infertility prevalence have been noted among different tribes and castes within the same region, highlighting the complexity of infertility patterns in India.

Furthermore, the reliability of infertility data in India is often hindered by inadequate reporting techniques and societal taboos surrounding male infertility, leading to underreporting and misrepresentation of prevalence rates. By gathering information on clinicians' practice regions, we aimed to indirectly ascertain the prevalence of male infertility across various regions of India. This question served to shed light on the trends and patterns of abnormal fertility, particularly within rural populations, providing valuable insights into the landscape of male infertility in different parts of the country. A total of 1039 clinicians participated in the survey, ensuring representation from each region of India, with at least 44 respondents from any specific region. Northern India constituted the largest proportion of respondents, comprising 43.8% (n = 606) of the total participants. Following fairly behind, 15.98% (n = 166) of clinicians hailed from southern India, while 11.55% (n = 120) were from the Eastern region. The Western region accounted for 9.91% (n = 103) of respondents, with the central region registering the lowest representation at 4.23% (n = 44). These findings indirectly suggest a higher prevalence of male infertility observed in Northern India, followed by southern, Eastern, and Western regions, with the central region exhibiting the least prevalence. However, it is imperative to acknowledge the limitations of these findings, as they are based on self-reported data and lack concrete prevalence figures. Thus, while these insights offer valuable perspectives, they should be interpreted with caution. Nonetheless, they contribute to the existing body of knowledge, shedding light on potential regional variations in male infertility prevalence.

**Limitations:** While this survey provides valuable insights into the practices and perspectives of gynecologists regarding male infertility management in India, several limitations must be acknowledged. Firstly, the survey depended on



gynecologist self-reported data introduces the potential for response bias, as participants may have provided answers influenced by personal beliefs, experiences, or social desirability. Additionally, the scope of survey was limited to gynecologists attending a specific conference, potentially excluding perspectives from other relevant specialists such as fertility or reproductive specialists, urologists or andrologists. Moreover, the questionnaire design of survey and limited response options may have influenced participant responses, possibly constraining the breadth of insights gathered. Furthermore, the focus of survey on clinicians attending a fertility conference may not fully represent the broader population of gynecologists across India, limiting the generalizability of the findings. Additionally, the cross-sectional nature of survey provides only a snapshot of current practices and opinions, lacking longitudinal data to assess trends over time. Lastly, the absence of verification or validation of respondents' reported practices and beliefs poses a challenge in confirming the accuracy and reliability of the data collected. Despite these limitations, this survey offers valuable preliminary insights into the landscape of male infertility management in India, highlighting areas for further research and clinical consideration.

**Key Learning Points or Learning Points to Carry Forwards:** This survey yields several key learning points that can inform future research and clinical practice in the management of male infertility in India. Firstly, it underscores the importance of interdisciplinary collaboration between gynecologists, urologists, and andrologists in addressing male infertility, given the multifactorial nature of the condition. Secondly, the survey highlights the need for increased awareness and education among healthcare professionals regarding the diagnosis and management of male infertility, particularly in rural and semi-urban areas where misconceptions and social stigma may prevail.

Thirdly, the findings emphasize the significance of evidence-based approaches in guiding treatment decisions, particularly in the use of interventions such as antioxidants and clomiphene, where practices vary among clinicians. Fourthly, the survey sheds light on regional variations in the

prevalence and management of male infertility across India, underscoring the importance of tailored approaches to address specific regional needs and challenges. One important thing to learn from this survey is that cultural and social beliefs can stop men from getting fertility tests done. This shows we need to change how society mind-set to see male fertility issues, and make it easier for men to seek help without feeling embarrassed or judged. This highlights the importance of addressing societal attitudes and perceptions surrounding male infertility, as well as the need for creating supportive and non-judgmental environments in healthcare settings to encourage men to seek necessary reproductive health services without fear of stigma or embarrassment. Finally, the identification of gaps and limitations in current clinical practices highlights the need for further research to fill these knowledge gaps and improve patient care outcomes in the field of male infertility. These learning points provide valuable insights for policymakers, healthcare providers, and researchers to enhance the quality of care and support for individuals experiencing male infertility in India.

**Survey Recommendation:** Based on the findings of the survey, several recommendations can be made to improve the diagnosis and management of male infertility. Firstly, there is a need for increased awareness and education campaigns aimed at reducing the stigma surrounding male infertility, which can discourage men from seeking help. Healthcare providers should be trained to address cultural and social barriers that may prevent men from undergoing fertility assessments. Additionally, efforts should be made to increase the number and improve access to fertility clinics and specialist care for men across all regions of India, particularly in rural areas where healthcare services may be limited. Furthermore, there is a need for standardized guidelines on the evaluation and management of male infertility to ensure consistent and evidence-based care. Finally, further research is needed to better understand the prevalence and causes of male infertility in India, as well as to evaluate the effectiveness of different treatment options. By implementing these recommendations, we can improve the overall quality of care for men struggling with infertility in India.

**CONCLUSION:** In a nutshell, the survey conducted among gynecologists attending the 19th Annual conference of the Indian Fertility Society (IFS) sheds light on the current landscape of male infertility diagnosis and management in India. The findings highlight the multifaceted challenges faced by both healthcare providers and patients, including cultural stigma, limited access to specialized care, and a lack of standardized guidelines. Despite these challenges, the survey also reveals opportunities for improvement, such as increasing awareness, enhancing healthcare provider training, and promoting research to better understand the prevalence and etiology of male infertility. By addressing these issues and implementing evidence-based strategies, we can work towards improving outcomes for men struggling with infertility and ultimately support couples in their journey towards parenthood.

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