Research Article

Shukra Dhatu and Male Reproductive Physiology: A Systematic Review of Ayurvedic Correlates of Semen Parameters, Spermatogenesis, and Reproductive Hormones

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Abstract

Shukra Dhatu is a central Ayurvedic concept related to male reproductive health and is commonly associated with semen quality, fertility, and reproductive function. However, its relationship with modern semen parameters, spermatogenesis, and reproductive hormones has not been systematically synthesized. To systematically evaluate the relationship between Shukra Dhatu and male reproductive physiology, with emphasis on semen parameters, spermatogenesis-related findings, and reproductive hormonal outcomes. A systematic literature review was conducted using PubMed, ScienceDirect, Google Scholar and DOAJ for studies published between 2012 and 2026. Human clinical studies addressing Ayurvedic concepts or interventions related to Shukra Dhatu and male reproductive outcomes were included. Study selection followed PRISMA 2020 guidelines, and methodological quality was assessed using appropriate JBI critical appraisal tools. Twelve studies were included in the qualitative synthesis. Ksheena Shukra, Shukra Kshaya, Shukralpata, and Kshina Retasa were commonly correlated with oligospermia or oligozoospermia. Sperm count showed the most consistent improvement, followed by semen volume, motility, morphology, vitality, liquefaction, pH, and viscosity. Evidence for direct spermatogenesis was limited, while hormonal findings involving FSH, LH, and testosterone were heterogeneous. Ayurvedic concepts of Shukra Dhatu show meaningful correspondence with modern semen-related outcomes, but stronger clinical evidence is required for direct spermatogenic and endocrine effects.

Keywords: Shukra Dhatu; Ayurveda; male infertility; semen parameters; spermatogenesis

1. Introduction

Shukra Dhatu is considered the endmost and the most exquisite tissue in Ayurveda, which is linked to reproductive strength, sexuality, vigor, and healthy babies. Its development is described using the concept of Dhatu Poshana, whereby the nourishment is sequentially passed on to the next successive tissues until the creation of Shukra Dhatu. This notion is not limited to semen itself but is gaining a new meaning in terms of structural and functional elements of reproductive biology today (Bharatiya and Phatak, 2026). Healthy Shukra is the traditional characteristic of fertility, reproductive power, and healthy bodies, and disruptions in this tissue are the causes of poor reproductive health (Roushan and Suthar, 2019). Ksheena Shukra, Shukra Kshaya, Shukralpata, Kshina Retasa and Shukra Dushti are Ayurvedic disorders that reflect quantitative or qualitative damage to male reproductive health. These disorders can occur as a decrease in the semen volume, low sperm density, poor motility, abnormal morphology, or low fertility. Kshina Shukra and variants are often associated with oligospermia, oligozoospermia, and combined sperm defects (e.g., oligo-astheno-teratozoospermia) in the contemporary clinical setting (Suryawanshi, 2026). Kshina Shukra has also been clinically reported as an Ayurvedic equivalent of oligospermia and discussed its treatment using classical therapies (Sharma et al., 2025).

Contemporary male reproductive physiology relies on the interaction of testicular functions, spermatogenesis, sperm maturation, the activity of the accessory glands, and endocrine control. Semen analysis is one of the main procedures used to evaluate the male reproductive potential and involves the volume of semen, concentration or count of sperm, semen motility, semen morphology, semen vitality, liquefaction, pH, and viscosity. The deviations in these parameters may lead to infertility or subfertility. Male infertility can also be associated with genetic factors that involve the SRY gene, AZF regions, and androgen receptor pathways, which have been mentionedz in combination with integrative Ayurvedic strategies for reproductive disorders (Pandeya et al., 2020). The hypothalamic-pituitary-gonadal axis is in

charge of hormonal regulation. FSH aids in the functions of Sertoli cells and spermatogenesis, and LH aids the Leydig cells in synthesizing testosterone. Testosterone plays a crucial role in spermatogenic development, male sexuality, and male reproductive physiology. Potential links between Shukra Dhatu and reproductive hormones, specifically, FSH, LH, and testosterone, have been studied in Ayurvedic literature with a possible conceptual interface between conventional reproductive physiology and contemporary endocrinology (Choudhary et al., 2021).

Clinical relevance of the relationship between Shukra Dhatu and modern reproductive physiology is thus a clinical issue. Healthy Shukra Dhatu can be conceptually related to normal quality of semen and reproductive competence, and Shukra Kshaya and Ksheena Shukra are often related to low sperm count and disturbed semen features. Ayurvedic fertility literature is increasingly assessing these ancient ideas by measuring quantifiable semen and hormonal parameters to assist in balancing classical theory and modern reproductive measurement (Ashwin et al., 2026). Vajikarana, Vrishya, Shukrala, Rasayana, and Brimhana are some of the Ayurvedic therapies in managing male reproductive dysfunction. Vidhate et al. (2025) estimate that classical Vajikarana Dravyas are used to enhance fertility and reproductive power. It has also been discussed that herbal interventions may have antioxidant, endocrine-modulating, and spermatogenic effects (Iqbal and Ahmed, 2025). Improvements in semen parameters following interventions like Masha-Madhu-Sarpi Yoga (Kale et al., 2025) have been reported clinically, and experimental studies have investigated the spermatogenic action of Shukrala herbs like Kakamachi (Yadav et al., 2025).

Although the Ayurvedic methods of male reproductive dysfunction are of increasing interest, the existing evidence is still mixed. A majority of research is based on semen parameters, but direct data on spermatogenesis and reproductive hormones are scarce. Ayurvedic concepts have also been applied to broader male reproductive disorders, suggesting the broader applicability of traditional reproductive concepts (Mahto et al., 2026). Nevertheless, there is still a lack of an integrated systemic synthesis between Shukra Dhatu and semen parameters, spermatogenesis, and reproductive endocrine outcomes. This is a systematic review that seeks to assess the issue of Shukra Dhatu and male reproductive physiology with reference to semen parameters, findings on the process of spermatogenesis, and findings on reproductive hormones. The spectrum encompasses human clinical demonstrations on Ayurvedic principles and interventions in the area of sperm count, motility, morphology, semen volume, vitality, liquefaction, pH, and viscosity, and reproductive hormones such as FSH, LH, and testosterone. It also discusses key Ayurvedic treatment methods and determines key gaps in the existing evidence base.

2. Methodology

2.1 Study Design

This review of the literature was systematic and assessed the connection between Shukra Dhatu and male reproductive physiology, with a focus on the semen parameters, spermatogenesis, and reproductive hormones. The review dealt with Ayurvedic concepts like Ksheena Shukra, Shukra Kshaya, Shukralpata, Kshina Retasa, and Shukra Dushti and how they correlate with clinical implications of male reproductive abnormalities. The PRISMA 2020 guidelines on systematic identification, screening, assessment of eligibility, and inclusion of studies were used as the basis of the review process.

2.2 Literature Search Strategy

A detailed search of the literature was performed in PubMed, Science Direct, Google Scholar, and DOAJ with studies from 2012 to 2026. Further searches were done by screening reference lists manually. Only human clinical studies in English were taken into account.

The main search string used was:("Shukra Dhatu" OR "Shukra Kshaya" OR "Shukralpata" OR "Kshina Retasa" OR "Shukra Dushti" OR "Shukravaha Srotas") AND (oligozoospermia OR sperm) AND Ayurvedic.

Slight modifications were made to the search terms where needed based on the indexing and search needs of each database.

2.3 Eligibility Criteria

Inclusion criteria were: original human clinical studies that tested Ayurvedic concepts or Ayurvedic interventions and which assessed male reproductive health and Shukra Dhatu. Qualified investigations concerned diseases like Ksheena Shukra, Shukra Kshaya, Shukralpata or Kshina Retasa and had reported reproductive results that were measurable. The outcomes were relevant in terms of semen volume, sperm count or concentration, motility, morphology, vitality, liquefaction time, semen pH, viscosity, findings of spermatogenesis, and reproductive hormones (FSH, LH, and

testosterone). Considered were randomized, comparative, controlled, open-label, pilot, and single-arm clinical studies. Duplicate studies, reviews, meta-analyses, editorials, conference abstracts, protocols, animal or in vitro studies, and studies that were not related to Shukra Dhatu were eliminated. Also excluded were studies that lacked pertinent semen, spermatogenesis, or hormonal results, studies with inadequate extractable reproductive information, and those that had no availability of complete text.

2.4 Study Selection

The identification of records was 355 records (345 records from electronic databases and 10 records from manual screening of references). Following the de-duplication of 55 records, 300 records were screened in terms of title and abstract, with 238 records being excluded. The remaining 62 full-text articles were evaluated as eligible. Among them, 50 studies were filtered out of the predefined criteria, such as irrelevance to Shukra Dhatu, no reproductive outcomes found, non-original study design, animal or in vitro research, inadequate data, or a lack of the full text. Lastly, 12 articles were incorporated in the qualitative synthesis. A PRISMA 2020 flow diagram was used to present the entire process of selection.

2.5 Data Extraction

A systematic framework was used to extract data. The information that was extracted consisted of author and year, study design, sample size, Ayurvedic diagnosis and corresponding modern reproductive correlate, intervention and comparator, duration of treatment of the subjects, and significant reproductive outcomes. They were also extracted to provide thematic synthesis of additional information about certain semen parameters, findings pertaining to spermatogenesis, findings related to reproductive hormones, statistical significance, and key clinical findings.

2.6 Quality Assessment and Risk of Bias

The quality of the methodology of the included studies was evaluated with the Joanna Briggs Institute (JBI) critical appraisal tool. JBI was deemed appropriate since the studies included had various clinical designs, such as randomized controlled trials, comparative studies, open-label studies, pilot studies, and single-arm interventions. The right JBI checklist was utilized depending on the study design. The evaluation concentrated on key methodological areas such as selection of participants, group comparability or control, intervention processes, measurement of outcomes, follow-up or completeness, and statistical analysis.

2.7 Data Synthesis

Statistical pooling was not thought to be suitable because the studies varied in study design, Ayurvedic diagnosis, intervention, sample size, and treatment duration, as well as reproductive outcomes. Consequently, a narrative synthesis was carried out. The results were classified into key themes: Ayurvedic analogs of Shukra Dhatu and male reproductive dysfunction, semen parameter effects, findings during spermatogenesis, reproductive hormonal outcomes, and Ayurvedic mechanism suggestions. This methodology allowed comparing traditional Ayurvedic-related concepts with measurable contemporary reproductive parameters in the studies included.

3. Results

3.1 Study Selection

A systematic search was used to find 355 records in the electronic databases and screening of the manual references. After removing 55 duplicate records, 300 records were screened on the basis of title and abstract. Out of them, 238 records were eliminated due to failure to satisfy the set eligibility criteria. The rest 62 full-text articles were evaluated based on their eligibility of which 50 were eliminated due to their irrelevance to Shukra Dhatu, lack of relevant reproductive outcomes, were non-original publication, animal or in vitro research, lacked sufficient extractable reproductive information or were not available in full version. Lastly, 12 articles published since 2012 were incorporated in qualitative synthesis. The entire process of study selection is outlined in Figure 1.

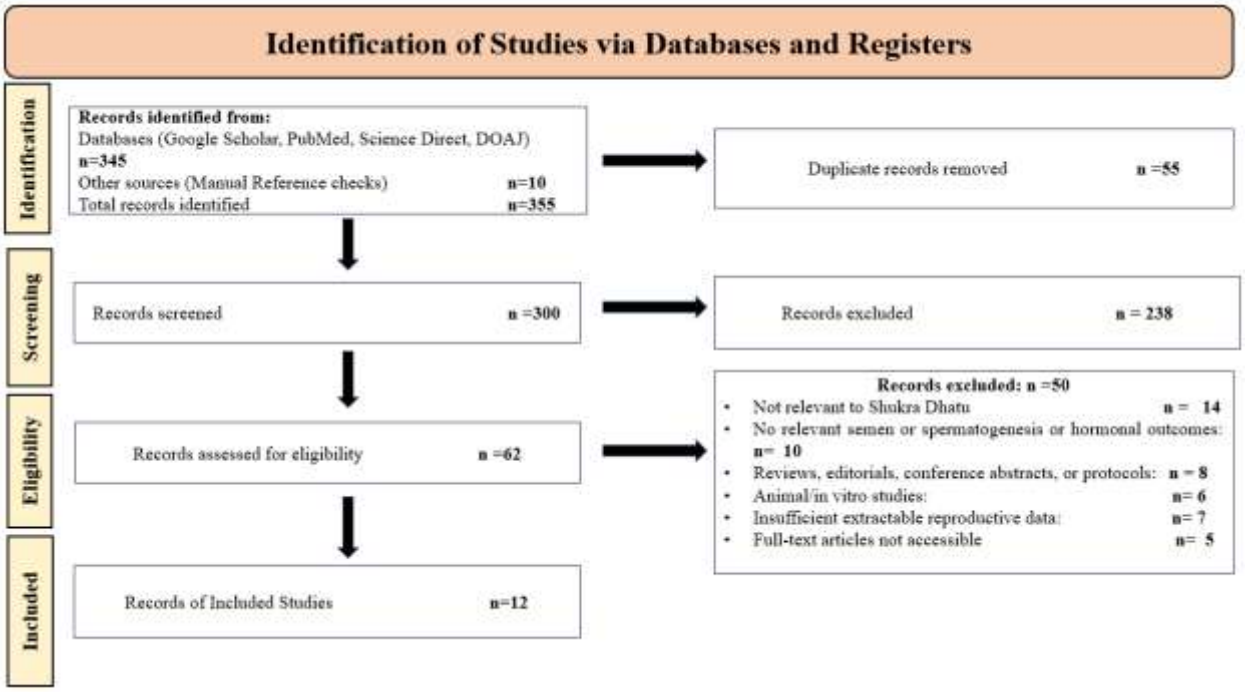


Figure 1. PRISMA Flow Diagram of Study Selection

3.2 Characteristics of Included Studies

The twelve studies used were randomized controlled studies, randomized comparative studies, open-label clinical studies, pilot studies, and single-arm interventional studies. A majority of the studies involved males with oligospermia or oligozoospermia and explained these conditions in Ayurvedic terms like Ksheena Shukra, Shukra Kshaya, Shukralpata, and Kshina Retasa. The interventions were single herbs, polyherbal preparations, dietary preparations, Virechana-based interventions and Ghrita-based interventions. The length of treatment was about one to three months. The most commonly reported outcomes were semen parameters, and a subset of studies only used direct hormonal assessment.

Table 1 provides a summary of the main features and reproductive results of the 12 studies included.

Table 1. Characteristics of the Included Studies

Author (Year)	Study Design	Sample Size	Ayurvedic Diagnosis / Modern Correlate	Intervention / Comparator	Duration	Major Reproductive Outcomes
Acharya et al. (2015)	Open-label pre–post clinical study	20 enrolled	Shukra Kshaya/Ksheena Shukra / Oligospermia	Ikshuradi Lehya / No comparator	90 days	Increased sperm count and active motility.
Gupta et al. (2013)	Clinical interventional study	24	Shukralpata/Shukra Kshaya / Oligospermia	Shukravardhaka Dravya / No separate control	30 days	Improved semen volume, count, motility, and viability.

Itani et al. (2026)	Two-phase observational and interventional study	Phase I: 500; Phase II: 30	Kshina Retasa / Oligospermia	Narasingha Churna / No comparator	90 days	Improved count, volume, motility, and morphology.
Kale et al. (2025)	Randomized controlled trial	90 randomized	Ksheena Shukra / Oligozoospermia	Masha-Madhu-Sarpi Yoga / Ashwagandha Churna	90 days	Improved semen volume, count, liquefaction, and sexual function.
Kamboj et al. (2026)	Randomized open-label controlled trial	30	Ksheena Shukra / Oligospermia	Masha Paayasa / Vidaryadi Choorna	45 days	Improved seminal parameters and overall clinical response.
Kumbhar et al. (2022)	Randomized comparative open clinical trial	42 enrolled; 40 completed	Ksheenasukra / Oligospermia	Sweta Musali / Rajata Bhasma	60 days	Improved sperm count, motility, and abnormal forms.
Lokesh et al. (2022)	Randomized comparative interventional study	60	Ksheena Shukra / Oligozoospermia	Virechana + Ashwattha Churna / Ashwattha Churna	Approximately 1 month after intervention	Improved semen parameters; limited hormonal changes.
Rath & Panja (2013)	Randomized double-blind placebo-controlled trial	30	Shukradhatu / Semen parameters and testosterone	Shweta Musali extract / Placebo	12 weeks	Improved semen parameters; testosterone increased, although statistical significance was inconsistently reported.
Shreehari et al. (2025)	Open-label single-arm study	30	Ksheena Shukra / Oligospermia	Mashadi Ghrita / No comparator	60 days	Improved volume, pH, count, and liquefaction.

Thirunavukkarasu et al. (2012)	Randomized double-blind controlled study	72 enrolled; 63 completed	Kshina Shukra / Oligozoospermia	Tribulus terrestris / Control	90 days	Improved semen parameters with hormonal assessment.
Varsakiya et al. (2016)	Pilot clinical study	20 enrolled; 19 completed	Ksheena Shukra / Oligozoospermia	Virechana + Ashwatha Phala Churna / No comparator	60 days	Improved sperm count, semen volume, and morphology; hormonal changes were statistically non-significant.
Varsakiya et al. (2019)	Clinical interventional study	42 enrolled; 38 completed	Ksheena Shukra / Oligozoospermia	Virechana + Go-Ghrita / No comparator	Approximately 8 weeks	Improved semen parameters and reproductive hormones.

3.3 Ayurvedic Correlates of Shukra Dhatu and Male Reproductive Dysfunction

The studies included demonstrated that there is a consistent relationship between abnormalities of male reproductive physiology and impaired Shukra Dhatu. Oligospermia or oligozoospermia was most often associated with Ayurvedic conditions of Ksheena Shukra, Shukra Kshaya, Shukralpata, and Kshina Retasa. Acharya et al. (2015) related Shukra Kshaya to the lower sperm concentration, and Gupta et al. (2013) characterized Shukra Kshaya as the presence of both qualitative and quantitative semen abnormalities.

This association was not just about the sperm count. Varsakiya et al. (2016) and Lokesh et al. (2022) matched Ksheena Shukra with oligozoospermia and assessed the corresponding modifications in semen traits. Itani et al. (2026) also combined Ayurvedic Retas Pariksha with contemporary semen analysis, correlating traditional seminal features with sperm concentration, motility, morphology, pH, viscosity, and liquefaction. Generally, the evidence provided indicated that Shukra Dhatu disorders are a wider range of defects of semen quantity and quality.

3.4 Effects on Semen Parameters

The most commonly measured reproductive outcomes in the included studies were the semen parameters. The greatest improvement was observed in sperm count, and there were also positive reports of improvement in motility, semen volume, morphology, vitality, liquefaction time, pH, and viscosity. Acharya et al. (2015) found that the count of sperm improved by 95.77 percent and from 8.094 to 15.846 million/mL in 90 days. Narasingha Churna resulted in a 55.91% increase in the number of sperm and a rise in semen volume and motility (Itani et al., 2026). Varsakiya et al. (2016) have reported a 59.78% increase in sperm count and a 36.81% increase in semen volume, whereas Varsakiya et al. (2019) have reported an 80.92% increase in sperm count along with the improvement of the motility, morphology, and semen volume. Table 2 sums up the general trend of semen-related results.

Table 2. Synthesis of Semen Parameter Outcomes Following Ayurvedic Interventions

Semen Parameter	Overall Pattern	Findings	Studies
Sperm count/concentration	Most consistently improved parameter	Marked increases were reported following treatment	Acharya et al. (2015); Itani et al. (2026)
Sperm motility	Generally improved	Increased active or total motility and reduced immotile sperm	Kumbhar et al. (2022); Itani et al. (2026)
Semen volume	Improved in several studies	Favourable increases were observed after Ayurvedic therapy	Varsakiya et al. (2016); Varsakiya et al. (2019)
Sperm morphology	Generally improved	Increased normal forms and/or reduced abnormal forms	Itani et al. (2026); Varsakiya et al. (2019)
Vitality/viability	Improved where assessed	Increased sperm viability was reported	Gupta et al. (2013); Kamboj et al. (2026)
Liquefaction time	Favourable changes	Improvement in liquefaction was observed	Kale et al. (2025); Shreehari et al. (2025)
pH/viscosity	Less frequently evaluated	Some favourable changes were reported	Lokesh et al. (2022); Shreehari et al. (2025)

3.5 Evidence Related to Spermatogenesis

Data that were more specific to spermatogenesis were not as direct as the data on semen parameters. No human clinical studies that had been included evaluated spermatogenesis by testicular histology, quantification of germ cells, or by using particular molecular spermatogenic markers. Thus, the effects of spermatogenesis were mainly deduced based on the gains in the sperm count, better morphology, and suggested biological processes.

Acharya et al. (2015) partially explained the observed improvement by the Shukrala, Vrishya, and Rasayana properties of the ingredients of Ikshuradi Lehya and characterized some of the components as potentially having spermatogenic effects. Rath and Panja (2013) proposed that saponins and stigmasterol in Shweta Musali can aid in spermatogenesis, and Varsakiya et al. (2016) associated the Vrishya effect of Ashwatha Phala Churna with increased sperm production. All evidence in general indicated a potential spermatogenesis-supporting effect, but this was mostly indirect.

3.6 Reproductive Hormonal Outcomes

The number of studies that assessed hormonal outcomes was lower compared to semen parameters. The main endocrine tests were FSH, LH, and testosterone. All three hormones were measured in Thirunavukkarasu et al. (2012) and semen parameters only in Rath and Panja (2013), but serum testosterone in particular. Varsakiya et al. (2016) have found decreased levels of FSH and testosterone and increased levels of LH, but none of the hormonal changes were statistically significant. Conversely, Varsakiya et al. (2019) reported great increases in FSH, LH, and testosterone in participants measured on hormonal outcomes. It was also found that there was an increase in testosterone by Rath and Panja (2013), though the article was somewhat inconsistent with the reporting of its statistical significance. In general, the results of the hormonal studies were inconsistent compared to the semen-related results, and were mentioned in very few studies. The results of the hormonal analysis are reported in Table 3.

Table 3. Synthesis of Reproductive Hormonal Outcomes Across the Included Studies

Hormonal Parameter	Overall Finding	Interpretation	Studies
FSH	Variable	Non-significant changes were reported in some studies, whereas significant increases were observed in another study.	Lokesh et al. (2022); Varsakiya et al. (2019)
LH	Variable	Changes differed across interventions and were not consistently statistically significant.	Varsakiya et al. (2016); Lokesh et al. (2022)
Testosterone	Mixed but potentially favourable	Increases were reported in some studies, although the direction and statistical	Rath & Panja (2013); Varsakiya et al. (2019)

		significance of changes were inconsistent across the evidence base.	

3.7 Ayurvedic Therapeutic Approaches and Reported Mechanisms

The studies included adopted therapeutic measures that were largely founded on the principles of Vajikarana, Vrishya, Shukrala, Rasayana, and Brimhana. Widely used medicines were Shweta Musali, Ashwagandha, Gokshura, Masha, Ashwattha, Ghrita preparations, and polyherbal preparations. The aim of these medicines was mainly to nourish Shukra Dhatu and enhance the male reproductive system. Another unique method of treatment was the application of Virechana before Vajikarana therapy. According to Varsakiya et al. (2016), Virechana facilitates Srotoshuddhi and enhances the absorption of the therapy that follows, thus facilitating Shukra formation. Likewise, Go-Ghrita, when applied after Virechana, was explained on the basis of its Vrishya, Rasayana, antioxidant, and Vata-pitta-pacifying qualities.

In a contemporary physiologic view, the suggested mechanisms involved antioxidant activity, alleviation of oxidative stress, enhanced nutritional support of reproductive tissues, regulation of reproductive hormones, as well as potential support of Leydig and Sertoli cell activity. Nevertheless, the authors of the studies suggested these processes, but not directly presented in the clinical studies.

3.8 Risk of Bias Assessment

The quality of the methodology of the 12 articles used was determined based on the study design by using the relevant JBI critical appraisal tools. Participant selection, control of groups or comparability, intervention procedures, outcome measurement, follow-up or completeness, and statistical analysis were assessed. These evidence bases included randomized controlled trials, randomized comparative studies, open-label clinical studies, pilot studies, and single-arm interventions.

Randomized and controlled studies typically exhibited relatively high methodological characteristics due to the inclusion of allocation processes and/or control groups. By contrast, open-label and single-arm studies had more methodological issues, especially with regard to group comparability or control and intervention processes. The majority of the studies had positive evaluations of the selection of participants, measurement of outcomes, follow-up or completeness, and statistical analysis. The general JBI critical assessment of the studies included is in Figure 2.

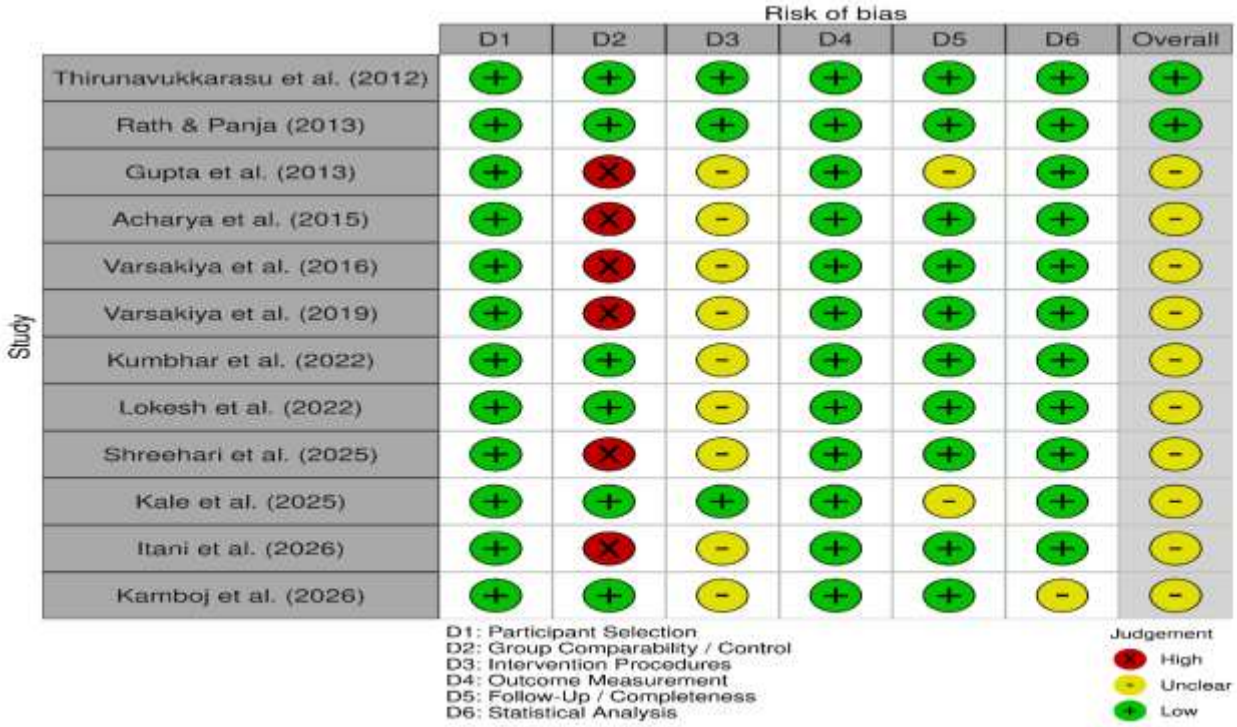


Figure 2. Traffic-Light Plot Summarizing the JBI Critical Appraisal of the Included Studies

On the whole, the evidence included had heterogeneous quality of the methods used, and the confidence in randomized and controlled studies and the possibility of bias in uncontrolled, pilot, and open-label research was relatively high.

3.9 Overall Evidence Synthesis

Generally, the results showed a reliable relationship between Ayurvedic ailments of Shukra Dhatu and quantifiable defects of male reproductive physiology. Ksheena Shukra, Shukra Kshaya, Shukralpata, and Kshina Retasa were mostly correlated with oligospermia or oligozoospermia and were also correlated with variations in semen volume, semen motility, semen morphology, semen vitality, semen liquefaction, and other seminal properties. Sperm count was found to be the most reliable result of Ayurvedic interventions, with subsequent results being semen volume, motility, and morphology. Any evidence involving spermatogenesis was supportive, but generally indirect since direct histological, cellular or molecular evaluation was usually not available. Hormonal data were relatively scarce and disparate, with only FSH, LH, and testosterone considered in a small proportion of studies. Collectively, the evidence available indicates a clinically significant association between Shukra Dhatu and modern-day semen parameters. Nonetheless, the interventions, study designs, sample sizes, and outcome assessment used are heterogeneous, which suggests that the evidence is currently more robust with respect to semen-related effects than direct spermatogenic or endocrine effects.

4. Discussion

The current systematic review suggests that Ayurvedic ideas involving Shukra Dhatu have clinical significance with quantifiable areas of male reproductive physiology, especially semen quality. In the studies included, Ksheena Shukra, Shukra Kshaya, Shukralpata and Kshina Retasa were commonly linked to oligospermia or oligozoospermia. Sperm count was the most consistent improvement in terms of treatment, followed by semen volume, motility, morphology, vitality, liquefaction and other seminal characteristics. Such results indicate that Ayurvedic accounts of impaired Shukra Dhatu might represent both quantitative and qualitative impairment of semen, as opposed to a reproductive abnormality. The extended meaning can be reconciled with the modern methods of male fertility evaluation that are gradually stressing the value of numerous reproductive parameters over sperm concentration (Abdul Rahman et al., 2025). The high proportion of positive semen-related results is also aligned with previous clinical evidence of the Ayurvedic and herbal treatments of oligospermia. A double-blind clinical trial of Tribulus terrestris indicated that reproductive parameters in men with oligozoospermia improved with the use of traditional reproductive formulations, thereby validating their therapeutic importance in such individuals (Sellandi et al., 2012). Equally, it has been reported that sperm count and other seminal characteristics have gotten better after the Svadamshtradi Choorna therapy in oligospermia, but evidence in individual cases should be taken with caution due to the lack of comparative controls (Lekshmi et al., 2022). Natural conception has also been clinically reported following Vajikarana Chikitsa in oligo-teratospermia, providing evidence of the possible clinical significance of the traditional fertility-enhancing methods in the absence of laboratory semen results (Uppin & Aravinth, 2025).

Unlike semen parameters, information about spermatogenesis was much more indirect. None of the human studies considered testicular histology, germ-cell development, or assays for particular spermatogenesis molecular markers. The positive changes in sperm count and morphology were thus considered primarily as indirect indicators of potential spermatogenic advantage. This is a significant difference since the advancement of ejaculated sperm parameters does not always indicate a direct biological impact on spermatogenic processes. However, such mechanisms as antioxidant activity, the decrease in the level of oxidative stress, the enhancement of the nutritional state of reproductive tissues, and endocrine regulation are biologically plausible. This is especially pertinent since psychological and oxidative stress are gradually becoming the factors that lead to impaired male fertility, and various herbal agents have been suggested to have protective effects on the condition due to antioxidant and stress-modulating properties (Malik et al., 2026). The heterogeneity of hormonal results was higher than that of semen-related results. Only a subset of studies examined FSH, LH, and testosterone, with some reporting significant changes and some reporting no significant changes or inconsistent changes. This implies that reproductive implications of Ayurvedic interventions might not be solely based on endocrine alteration. However, androgenic activities of Ayurvedic preparations have been observed in other reproductive situations in males. Indicatively, Makaradhwaja

Rasa has been linked to the androgenic benefit of late-onset hypogonadism, and it suggests that chosen Ayurvedic treatments could have the potential to regulate hormones (Chauhan et al., 2025). Nevertheless, this evidence cannot be directly extrapolated to oligospermia unless bigger controlled studies are conducted.

The implications of the findings to the field of integrative reproductive medicine are also general. Ayurvedic principles like Beeja, Shukra Dhatu and reproductive purification lay stress on reproductive quality and healthy progeny, which can be a helpful conceptual framework of preventive and fertility-oriented care (Sani et al., 2025). The review clinically suggests the possible usefulness of the standardized semen analysis as a disintermediate between Ayurvedic diagnosis and contemporary reproductive evaluation.

There are various restrictions to be taken into account. The studies included were heterogeneous in design, sample size, intervention, duration of treatment, and outcome measures, with many being open-label, single-arm, or pilot studies. In some studies, direct spermatogenic assessments were not done, hormonal analysis was only done in a few studies, and the statistical reporting was inconsistent. Further studies ought to concentrate on, however, adequately powered randomized controlled trials, standardized diagnostic definitions, WHO-based semen assessment, homogeneous hormonal testing, extended follow-up, and direct biomarkers of spermatogenesis. These studies would aid in establishing whether or not the perceived improvements can be reproducible physiological effects, as well as clarify the mechanism of action between Shukra Dhatu and modern male reproductive biology.

5. Conclusion

This systematic review indicates that Ayurvedic ideas of Shukra Dhatu relate to clinical significance with quantifiable parameters of male reproductive physiology. In the studies that were included, Ksheena Shukra, Shukra Kshaya, Shukralpata, and Kshina Retasa were often related to oligospermia or oligozoospermia and the mention of abnormalities in the quality of semen. Among the response outcomes assessed, the largest positive change was observed in the sperm count, but beneficial changes were also found in the semen volume, motility, morphology, vitality, liquefaction, pH, and viscosity. The evidence pertaining to spermatogenesis was relatively low since the majority of the studies failed to directly evaluate testicular histology, sperm-cell development, and certain biomarkers of spermatogenesis. The data on hormones (FSH, LH, and testosterone) were also not homogeneous and could be found in only a part of the studies. Thus, the existing evidence is more convincing in terms of semen-mediated effects than direct spermatogenic or endocrine effects. In general, Ayurvedic treatment methods seem to have potential in helping men achieve better reproductive health, especially by enhancing semen properties. Nevertheless, the heterogeneity in study design, small sample size, lack of controls, brief treatment periods, and inconsistent hormonal analyses limit any solid conclusions. To enhance the evidence base, future studies should incorporate well-designed randomized controlled trials, standardized semen and hormonal assessment, prolonged follow-up, and direct measurement of the spermatogenic processes.

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