ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

A Comprehensive Review on Male Sexual Dysfunction: Current Understanding and Management

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Publication Date: 2026/01/08

Abstract: Sexual dysfunction (SD) encompasses a broad range of disturbances in sexual behavior, response, and sensation, characterized by abnormalities or absence of psychological and physiological sexual reactions. Common manifestations include erectile dysfunction (ED), impaired sexual performance, and reduced libido. Epidemiological data indicate that approximately 52% of men aged 40–70 experience some degree of SD. Male reproductive physiology is highly sensitive to numerous biological, psychological, and environmental factors, including chronic diseases, lifestyle habits, toxic exposures, and stress. Although substantial progress has been made in recent years in understanding the physiology underlying male sexual function and the mechanisms associated with various forms of SD, the precise etiology remains incompletely understood. Moreover, therapeutic options addressing the physiological basis of these disorders are still limited. This review synthesizes recent findings from clinical and experimental studies related to the physiology of male sexual function, highlights the pathogenic and risk factors contributing to SD, and outlines classical and emerging management strategies. The insights from current literature provide a systematic understanding of the physiological mechanisms involved and may support more effective prevention and treatment approaches for male sexual dysfunction.

How to Cite: Dipak S. Salve; Shraddha V. Wagh; Atharva A. Tekade; Nikita D. Chavan; Nitin R. Kale; Dr. Gajanan Sanap (2026) A Comprehensive Review on Male Sexual Dysfunction: Current Understanding and Management. *International Journal of Innovative Science and Research Technology*, 11(1), 191-200. https://doi.org/10.38124/ijisrt/26jan187

I. INTRODUCTION

Male sexuality is a complex physiological process and an essential component of overall quality of life. Normal sexual function depends on the integrated activity of multiple body systems, including the nervous, cardiovascular, endocrine, and reproductive systems. Any disturbance in these systems—or in psychosocial factors—can adversely affect sexual performance and satisfaction. Male sexual dysfunction (SD) is not a single condition but represents a wide spectrum of disorders occurring throughout the sexual response cycle, including sexual desire, arousal, erection, penetration, ejaculation, and orgasm. Erectile dysfunction (ED), defined by the National Institutes of Health as the persistent inability to achieve or maintain sufficient penile rigidity for satisfactory sexual activity, remains one of the most common and challenging forms of SD.[1]

Sexual dysfunction affects men across all ages, ethnicities, and cultures. Epidemiological studies, such as the Massachusetts Male Aging Study, indicate that approximately 52% of men aged 40–70 experience some degree of SD, and an estimated 10 million men in the United States alone suffer from impotence. Despite significant progress in basic research, the exact pathogenesis of SD remains incompletely understood.[2 3]

The male sexual response cycle can be broadly divided into three stages: libido (desire), erectile function, and sexual activity. Disruption in any of these stages—from psychological stress or trauma to vascular disease, neurological impairment, hormonal imbalance, or surgical injury—can result in sexual dysfunction.[4] Numerous risk [5]factors have been identified, including chronic diseases (such as cardiovascular disease, hypertension, diabetes, and chronic kidney disease),[6] environmental pollutants, lifestyle changes, and adverse drug reactions. It is estimated that

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

approximately one-quarter of impotence cases in medical outpatients may be drug-associated, with anti-hypertensives, hormonal agents, and certain chemotherapeutics among the commonly implicated medications.[7]

Additionally, the increasing global incidence of chronic diseases and exposure to environmental contaminants such as endocrine disruptors, heavy metals, and radiation further contributes to male SD. Although various therapeutic strategies exist, targeted treatments specifically addressing the underlying pathophysiology remain limited.[8] The introduction of sildenafil in the 1990s marked a major milestone, yet many traditional medicines and herbal remedies continue to be used without rigorous scientific validation.[9]

This review aims to summarize recent findings on the physiology of male sexual function and the pathogenic mechanisms contributing to SD. We discuss the roles of endothelial, hormonal, hemodynamic, and neurogenic pathways, highlight major risk factors affecting male sexuality, and examine the therapeutic potential of medicinal plants and other interventions.[10] By integrating evidence from clinical and experimental studies, this review provides a comprehensive understanding of the development of male SD and offers insights that may support future strategies in sexual medicine.[11]

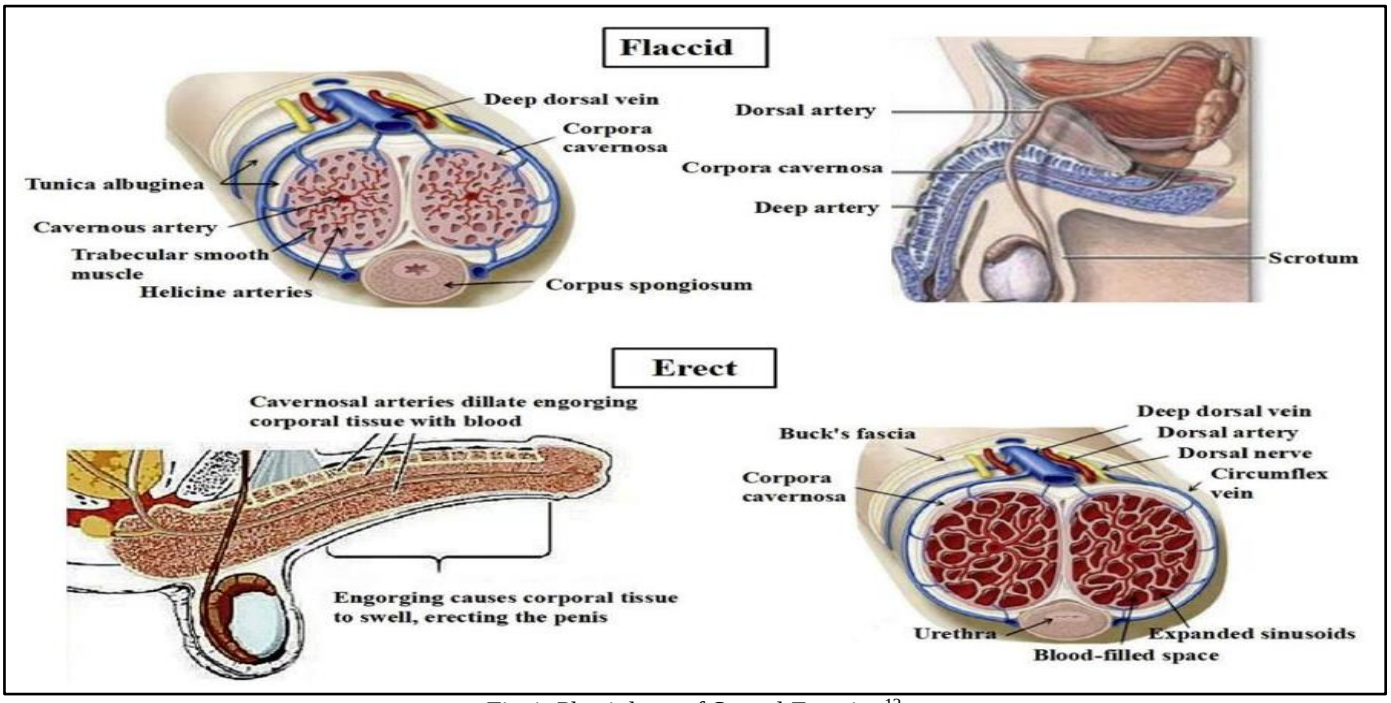

Fig 1 Physiology of Sexual Function[12]

II. PATHOPHYSIOLOGY OF SEXUAL FUNCTION AND DYSFUNCTION

The pathophysiology of sexual function involves a complex integration of neurological, vascular, hormonal, and psychological mechanisms that coordinate sexual desire, arousal, and orgasm. Any disruption in these systems can result in sexual dysfunction, which is increasingly recognized as a multifactorial clinical condition. Sexual desire originates from cortical and limbic brain regions, where sensory inputs, emotional triggers, and cognitive processing stimulate the hypothalamus. This initiates autonomic signals that regulate genital and systemic responses. A balance between parasympathetic and sympathetic activity is essential for normal sexual arousal; parasympathetic pathways predominantly mediate genital vasodilation and lubrication, while sympathetic pathways coordinate orgasm and ejaculation.[13]

Vascular mechanisms contribute significantly to sexual arousal. Penile erection and clitoral engorgement depend on nitric oxide (NO)–mediated smooth muscle relaxation within the corpora cavernosa. Any impairment in endothelial function, commonly seen in diabetes, hypertension, dyslipidemia, and smoking, reduces NO bioavailability and disrupts the hemodynamic balance required for arousal. Similarly, vascular insufficiency or atherosclerosis limits genital blood flow, diminishing both erectile rigidity and vaginal lubrication. Sexual dysfunction is therefore considered an early marker of systemic endothelial dysfunction.[14]

Hormones play a regulatory role across all phases of the sexual response cycle. Testosterone maintains libido in all genders, and low testosterone levels diminish sexual desire and arousal sensitivity. Estrogen supports vaginal tissue health, lubrication, and pelvic blood flow; its deficiency in menopause often produces dyspareunia and reduced arousal. Hyperprolactinemia, thyroid dysfunction, and abnormal cortisol levels also interfere with neuroendocrine signaling involved in sexual interest and reward pathways.[15]

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

Neurological integrity is equally essential, as peripheral nerves carry sensory information from genital tissues and transmit autonomic signals that regulate vascular and muscular responses. Disorders such as neuropathy, spinal cord injury, pelvic surgeries, and neurodegenerative diseases disrupt these pathways and lead to impaired sensation, arousal deficits, or anorgasmia. Central neurotransmitters including dopamine, serotonin, and oxytocin influence mood, motivation, and bonding; imbalances or drug-induced alterations in these chemicals contribute significantly to sexual dysfunction. Selective serotonin reuptake inhibitors (SSRIs), for example, commonly prolong orgasm latency and reduce libido through serotonin-mediated inhibition of dopamine activity[44].

Psychological factors create an additional layer of pathophysiology, as stress, anxiety, depression, and relationship conflict can inhibit cortical signals involved in desire and arousal. Performance anxiety activates the sympathetic system, counteracting parasympathetic processes required for erection or lubrication. Trauma, negative body image, and cultural conditioning can suppress sexual motivation through both cognitive and neuroendocrine pathways.

Overall, the pathophysiology of sexual dysfunction reflects an intricate interaction between biological and psychosocial elements. Contemporary research emphasizes the need to evaluate sexual dysfunction within a biopsychosocial model, recognizing that even mild disturbances in one domain can generate broader dysfunction across the sexual response cycle. This understanding supports more comprehensive diagnostic and therapeutic approaches that integrate medical, behavioral, and psychological interventions.[16]

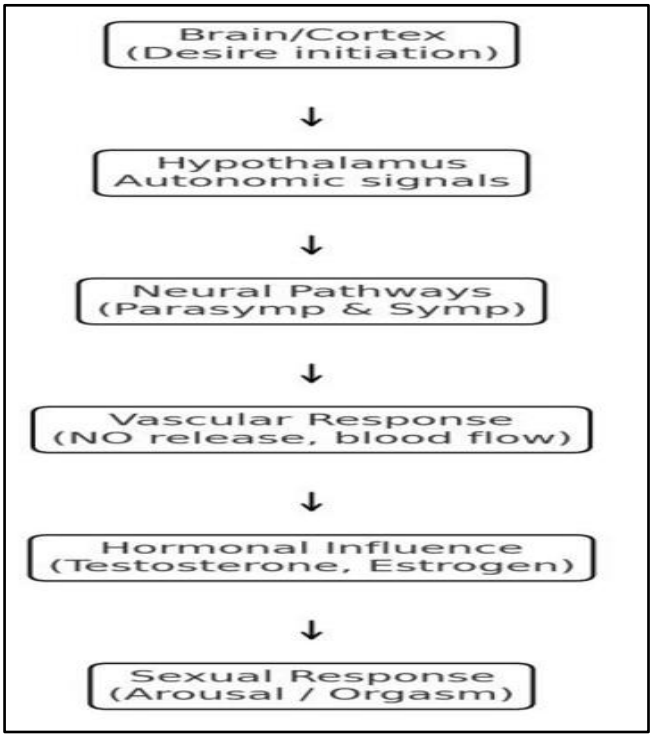

Fig 2 Pathophysiology of Sexual Function and Dysfunction

III. DISADVANTAGES

Alcohol consumption has significant adverse effects on sexual activity and overall sexual physiology. Because alcohol is a central nervous system depressant, it slows neural signaling and reduces genital sensitivity, which commonly results in erectile dysfunction. Chronic alcohol use further damages vascular tissues and lowers testosterone production, making erection problems both frequent and severe[5]. Overall sexual performance is compromised, as alcohol impairs coordination, stamina, reaction time, and energy levels, reducing satisfaction for both partners. In addition, impaired judgment under the influence of alcohol increases the likelihood of risky sexual decisions, including failure to use protection, choosing unsafe partners, higher risk of sexually transmitted infections, and emotional distress following the encounter. Nicotine causes persistent constriction of blood vessels, leading to reduced penile blood flow and difficulty achieving or maintaining an erection. In younger men, smoking is recognized as one of the most preventable causes of erectile dysfunction. By interfering with normal endocrine function, smoking also lowers testosterone levels, contributing to diminished libido, reduced sexual stamina, and decreased fertility. Long-term smoking weakens lung capacity and physical stamina, causing rapid fatigue during sexual activity[3].

IV. NEED OF THE STUDY

Male sexual function is a fundamental component of men's overall health, wellbeing, interpersonal relationships, and reproductive capacity. Despite its central role in quality of life and public health, male sexual dysfunction (SD) remains under-recognized, incompletely understood, and inadequately treated. The rapid rise of chronic noncommunicable diseases, widespread exposure to environmental contaminants, evolving psychosocial stressors, and the persistent global burden of infertility underscore the urgency of updating and integrating current physiological knowledge.[10] This review addresses that urgency by synthesizing recent literature on the physiology of male sexual function to clarify mechanisms, identify gaps in knowledge, and propose directions for research and clinical practice.[17]

First, the complexity and multisystem nature of male sexual physiology necessitate periodic, comprehensive syntheses. Penile erection and sexual response are not isolated events but the result of tightly coordinated neural, vascular, endocrine, and psychological processes. Advances in molecular biology, neuroendocrinology, vascular medicine, and reproductive science in recent decades have produced a large and diverse body of work. However, these findings are dispersed across specialty journals and experimental models. A consolidated, up- to-date review will help clinicians and researchers translate mechanistic discoveries—such as novel signaling pathways, endothelial biomarkers, and neuropeptide roles—into clinical understanding, thereby improving diagnostic precision and therapeutic targeting.[18] [19]

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

Second, the epidemiology of SD and its major risk factors has evolved. The prevalence of diabetes, metabolic syndrome, cardiovascular disease, and obesity continues to climb globally; all of these conditions are tightly linked to sexual dysfunction through hormonal, endothelial, and hemodynamic pathways. Simultaneously, growing evidence implicates environmental exposures—endocrine-disrupting chemicals, heavy metals, and radiative agents—in subtle but clinically meaningful disruptions of sexual and reproductive physiology. A contemporary review is essential to aggregate epidemiological trends and mechanistic data, clarifying which factors exert the greatest influence on sexual health in different populations and life stages.[20]

Third, therapeutic advances and their limits must be critically evaluated. Pharmacotherapies such as phosphodiesterase-5 inhibitors revolutionized symptom management for erectile ysfunction, but they do not address many underlying pathologies (e.g., hormona insufficiency, endothelial disease, neurogenic injury). Furthermore, interest in regenerative approaches, hormonal modulation, lifestyle interventions, and botanical or traditional medicines has grown—yet the evidence base for many of these alternatives remains fragmented and inconsistent.[21] A methodical review of recent clinical trials, translational studies, and preclinical work will reveal promising directions, evidence gaps, and potential risks, informing both clinical decision-making and future trial design.[22]

Fourth, important mechanistic questions remain unresolved and warrant integrated attention. For instance, the interplay between endothelial dysfunction and neurogenic signaling in the corpus cavernosum, the modulatory role of novel neuropeptides on hypothalamic–pituitary– [23]gonadal axes, and how systemic inflammation alters local penile microvascular function are active areas of research. These mechanistic uncertainties limit the capacity to design curative or disease-modifying therapies. By synthesizing in vivo, in vitro, and clinical data, this review can elucidate converging findings and highlight high-priority mechanistic hypotheses for targeted research.[24]

Fifth, there is a pressing need to bridge bench-to-bedside translation. Many discoveries in animal models have not been rigorously tested in humans, and conversely, clinical observations often lack mechanistic explanation. A comprehensive review will map the translational landscape—identifying where preclinical findings have successfully informed clinical practice and where translational bottlenecks persist. This mapping can guide funding priorities, encourage multidisciplinary collaborations, and promote research that is more likely to yield clinically relevant outcomes.[25]

Sixth, sexual dysfunction carries substantial psychosocial and relational consequences that are not addressed solely by symptom-targeted interventions. Anxiety, depression, relationship strain, and reduced life satisfaction commonly accompany SD, yet many clinical pathways treat these sequelae separately from physiological contributors. An updated physiological review that also integrates psychosocial determinants can encourage holistic, biopsychosocial care models—aligning physiological interventions with psychotherapeutic and relational supports to achieve better long-term outcomes.[26]

V. METHODS

The present review was conducted using a structured and systematic approach to identify, select, evaluate, and synthesize the most recent scientific literature related to the physiology of male sexual function and the mechanisms contributing to sexual dysfunction (SD). Although this study is a narrative review, it incorporates several principles of systematic review methodology—including explicit inclusion criteria, comprehensive searching, and transparent data extraction—to enhance reliability and academic rigor. The methods used in the preparation of this review are described in detail below.[27]

➢ *Study Design*

This review employed an integrative literature review design, which allows the inclusion of experimental studies, clinical research, epidemiological data, and mechanistic investigations. Because the physiology of male sexual function spans multiple scientific domains— endocrinology, neuroscience, cardiovascular physiology, andrology, pharmacology, and environmental health—an integrative approach was essential to capture the breadth of current knowledge. Both human and animal studies were considered to gain insights into mechanistic pathways.[28]

➢ *Search Strategy*

A comprehensive literature search was conducted across multiple electronic scientific databases. The databases searched included:

- PubMed/MEDLINE
- Scopus
- Web of Science
- ScienceDirect
- Google Scholar (for grey literature and citation tracking)

The search covered publications from January 2000 to October 2025, with particular emphasis on studies published in the last 10 years to capture the most current findings related to sexual physiology.

➢ *Inclusion and Exclusion Criteria*

To ensure relevance and scientific quality, the following criteria were established before screening:

- *Inclusion Criteria*

✓ Peer-reviewed original research articles, reviews, meta-analyses, and systematic reviews.
✓ Human studies and relevant animal or in vitro studies exploring physiology or pathophysiology.
✓ Articles examining hormonal, endothelial, neurogenic, psychogenic, vascular, or hemodynamic components of male sexual function.
✓ Studies investigating risk factors such as chronic diseases,

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

environmental pollutants, and pharmaceutical-induced dysfunction.
- ✓ Publications in English.
- ✓ Studies with clearly defined methodologies and measurable outcomes.[29]

- *Exclusion Criteria*

- ✓ Non-scientific literature (news articles, blogs, opinion pieces).
- ✓ Studies focused exclusively on female sexual function unless mechanistically relevant to male physiology.
- ✓ Articles lacking methodological details or presenting anecdotal evidence.
- ✓ Publications before the year 2000 (unless foundational for mechanistic explanation).
- ✓ Case reports without generalizable findings.[30]

➢ *Quality Assessment*

Although the review includes diverse study types, an attempt was made to evaluate the methodological quality of included studies. The following tools were used depending on study design:[31]

- Randomized clinical trials: Cochrane Risk of Bias Tool
- Observational studies: Newcastle-Ottawa Scale
- Animal studies: ARRIVE guidelines checklist
- Narrative reviews: SANRA assessment
- Systematic reviews/meta-analyses: AMSTAR 2 tool

Studies judged as "low quality" but providing essential conceptual insights were included cautiously, with limitations noted.[32]

➢ *Data Synthesis*

Given the heterogeneity of study designs, populations, and outcomes, a qualitative thematic synthesis approach was used. Findings were organized into major physiological categories:

- Endothelial mechanisms and NO-cGMP signaling
- Hormonal regulation and HPG axis physiology
- Hemodynamic principles of erection
- Neurogenic pathways and central-peripheral integration
- Psychogenic influences and stress-related modulation
- Influence of chronic diseases
- Impact of environmental pollutants
- Drug-induced sexual dysfunction
- Therapeutic agents including medicinal plants

Within each category, results were compared, cross-referenced, and summarized to highlight consistent findings, conflicting evidence, and research gaps.[33]

No quantitative meta-analysis was performed due to vast methodological variability and the integrative nature of the review.

VI. SCOPE OF STUDY

The scope of this study has been carefully defined to provide a comprehensive, integrative, and up-to-date understanding of the physiology of male sexual function and the pathological mechanisms underlying male sexual dysfunction (SD). Given the complexity of male sexual physiology—spanning neural, vascular, hormonal, psychological, and environmental dimensions—this review aims to synthesize diverse scientific findings while maintaining clear boundaries to ensure depth, relevance, and coherence. The scope of the present study is organized into thematic domains that collectively outline its breadth, focus, and limitations.[34]

➢ *Physiological Domains Covered*

- *Endocrine and Hormonal Physiology*

A major part of the study focuses on the hormonal regulation of male sexual function. The review examines:

- ✓ The role of the hypothalamic–pituitary–gonadal (HPG) axis.
- ✓ Interactions among GnRH, LH, FSH, and testosterone.
- ✓ The contribution of Sertoli and Leydig cell functions.
- ✓ Effects of androgen deficiency, hypogonadism, age-related hormonal decline, and endocrine disruption.[35]

The scope includes discussions on neuropeptides such as kisspeptin, dopamine, GABA, and glutamate that regulate GnRH release and modulate sexual desire and arousal. Studies on hormonal therapy and endocrine-related interventions are considered where mechanistically relevant.[30]

- *Neurophysiology of Sexual Function*

The review incorporates findings on both central nervous system (CNS) and peripheral nervous system (PNS) involvement in sexual processes. Covered subtopics include:

- ✓ Neural pathways that mediate libido, erection, ejaculation, and orgasm.
- ✓ The role of sympathetic, parasympathetic, and somatic innervation.
- ✓ Functions of neurotransmitters (serotonin, acetylcholine, noradrenaline, dopamine).
- ✓ Neurogenic factors contributing to SD, such as nerve injury, neuropathy, and impaired neurotransmission.

Studies detailing neural plasticity, spinal reflex arcs, brain imaging related to sexual arousal, and psychogenic influences are included within the scope.

- *Vascular and Endothelial Physiology*

Given that erection is fundamentally a vascular event, the study includes:

- ✓ Endothelial nitric oxide (NO) production.
- ✓ cGMP signaling pathways and smooth muscle relaxation.
- ✓ Arterial perfusion, venous occlusion, and cavernous hemodynamics.

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

✓ Structural changes in penile arteries associated with vascular diseases.

This section also evaluates endothelial dysfunction as a primary mechanism linking SD with cardiovascular disease, hypertension, diabetes, and metabolic syndrome[54].

- *Hemodynamic Mechanisms*[36]
  The review covers:

✓ The dynamics of blood inflow and venous trapping during erection.
✓ Changes in penile vascular resistance.
✓ Pathologies affecting arterial elasticity and smooth muscle compliance.
✓ Hemodynamic assessment methods used in research.

The scope includes insights from ultrasound studies, Doppler measurements, and animal models for penile microcirculation.

➢ *Pathophysiological Factors Included*

- *Chronic Diseases and Comorbidities*
  The study covers physiological disruptions caused by:

✓ Diabetes mellitus
✓ Hypertension
✓ Cardiovascular diseases
✓ Obesity and dyslipidemia
✓ Chronic kidney disease
✓ Prostate and reproductive cancers
✓ Neurological disorders

The mechanisms by which these diseases impair sexual physiology—through endothelial damage, nerve degeneration, hormonal imbalance, or oxidative stress—fall within the scope.[37]

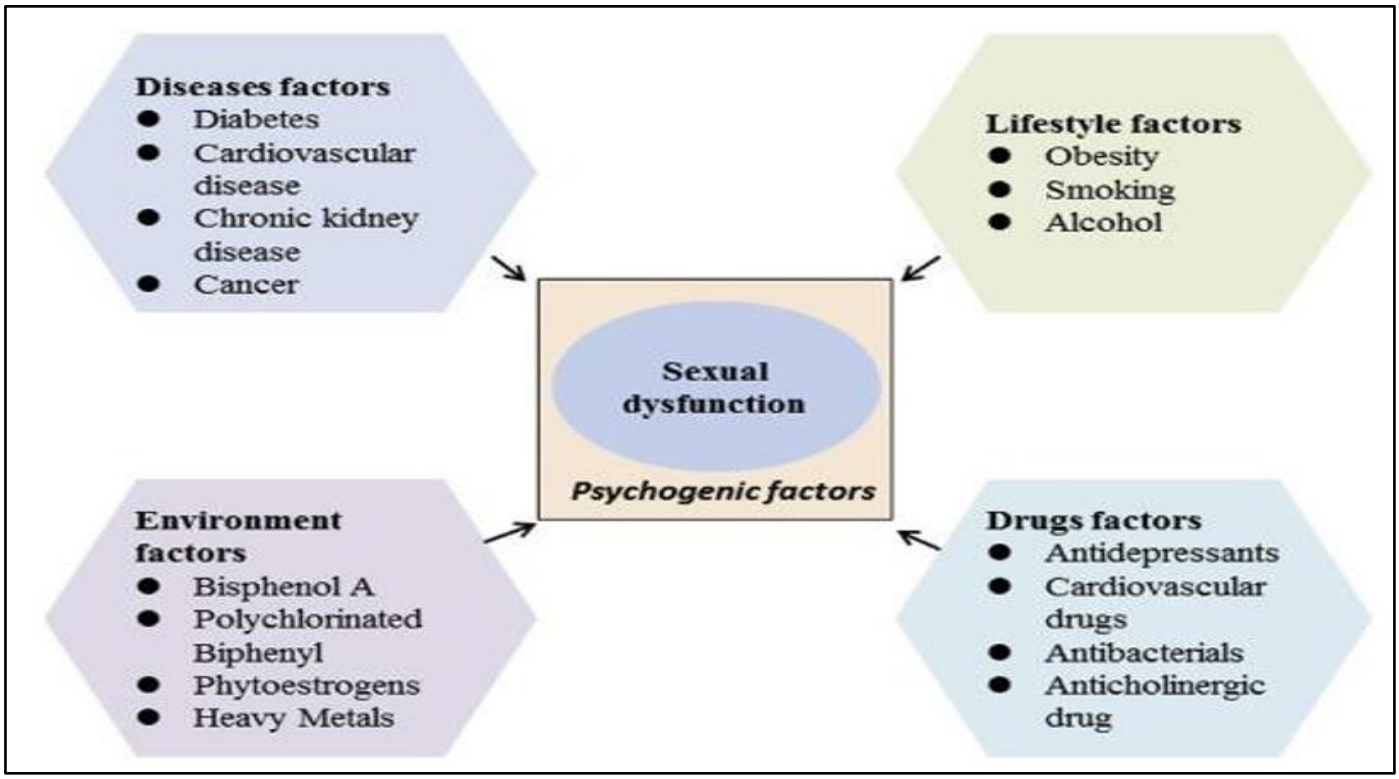

Fig 3 Sexual Dysfunctions

- *Lifestyle and Behavioral Factors*
  Included in the review are physiological effects of:[38]

✓ Sedentary lifestyle
✓ Smoking, alcohol, and substance use
✓ Poor diet and obesity
✓ Psychological stress, depression, and anxiety
✓ Sleep disturbances
✓ Age-related decline in sexual physiology

How these factors influence hormonal regulation, vascular function, and neural pathways is analyzed through recent literature.

- *Environmental and Toxicological Influences*
  The study incorporates research on:

✓ Endocrine-disrupting chemicals (phthalates, BPA, pesticides)
✓ Heavy metals (lead, cadmium, arsenic)
✓ Radiation exposure
✓ Air pollutants

These factors are included because they affect sexual physiology by interfering with the HPG axis, damaging vascular endothelium, or impairing testicular function.[39]

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

- *Drug-Induced Sexual Dysfunction*

Within the scope is a review of drugs that influence physiological pathways related to sexual function, such as:[40]

✓ Antihypertensives
✓ Antidepressants
✓ Hormonal agents
✓ Chemotherapeutic drugs
✓ Anti-androgens and anabolic steroids
✓ Lipid-lowering drugs

The study synthesizes mechanisms by which these drugs impair libido, erection, and ejaculation.[39]

- *Role of Medicinal Plants and Natural Products*

The scope includes evaluation of recent preclinical and clinical research on:

✓ Herbal medicines used to treat SD
✓ Phytochemicals affecting NO pathways, testosterone levels, or neural function
✓ Antioxidant and anti-inflammatory effects of plant extracts[41]

This inclusion reflects growing global interest in natural therapeutic options.

➢ *Types of Studies Included*

Because this review aims to integrate multiple dimensions of physiology, the study includes:[42]

- Experimental laboratory studies
- Animal studies exploring molecular mechanisms
- Human clinical trials
- Epidemiological studies
- Observational studies
- Systematic reviews and meta-analyses
- In vitro mechanistic investigations

Works from urology, endocrinology, reproductive medicine, andrology, pharmacology, and neuroscience are included.

The study also considers historically significant papers—when necessary—to explain foundational mechanisms such as the NO–cGMP pathway.[43]

➢ *Timeframe and Literature Sources*

The review emphasizes recent developments, especially research published from 2010 to 2025, though earlier seminal works are referenced for conceptual clarity. Databases covered include PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar.

VII. RISK FACTORS

Risk factors for sexual dysfunction Numerous epidemiological studies have reported on sexual problems that are prevalent in the society. Sexual complaints, especially ED, occur in 30%–40% men. In most cases, ED was initially considered a psychological disorder but is now regarded as a primary organic complication Medical researchers confirmed that organic ED is caused by hormonal, neurological, or vascular pathologies. Factors that put patients at risk of SD are as follows:[45]

➢ Adverse environmental factors, such as ionizing radiation, heavy metals, or environmental estrogen over-proof;
➢ Drugs, including anti-tumor, antihypertensives, and antibiotics; and
➢ Chronic diseases, such as diabetes and obesity, hypertension, hormonal disturbances, stress, and anxiety

- *Chronic Diseases Causing Sexual Dysfunction*

Sexual dysfunction and diabetes and its complications SD is a common organic complication associated with diabetes mellitus (DM) and may include impotence or ejaculation dysfunction (ED), ejaculation disorder (premature or delayed ejaculation), and decrease in libido. In addition, before the 10th Century when Avicenna mentioned that sexual exhaustion‖ is a special kind of diabetic complication, people have realized that SD is related to diabetes. National Health and Nutrition Examination Survey reported that 51.3% of diabetic men suffered from ED. Diabetes is considered to one of the risk[40].

A systemic vascular disease affects not only the major arteries of the body but also the small arteries of the penis and vagina. Because of this, sexual dysfunction (SD) can be an early warning sign of hidden cardiovascular disease in men who otherwise appear healthy. Many studies show that cardiovascular diseases (CVD) and SD often occur together and share similar risk factors such as high blood pressure, diabetes, smoking, aging, and obesity. Hypertension is one of the most common diseases, affecting about 20%–25% of adults. Research shows that about 30% of men with hypertension experience erectile dysfunction (ED) to different degrees. The longer a person has high blood pressure and the more severe it is, the worse the ED becomes. A recent study found no difference in ED rates between young hypertensive, prehypertensive, and normal men aged 25–40 years, suggesting that hypertension may cause damage that shows up only after several years[7].

Stroke also has a strong effect on sexual health. Many stroke patients and their partners avoid sexual activity because they fear another stroke or feel embarrassed. Stroke often causes emotional problems such as depression and anxiety, which reduce sexual desire and affect overallqualityoflife.

Atherosclerosis is another major cause of sexual problems. In patients with impotence, the arteries and smooth muscle in the penis become narrow and weak, preventing normal blood flow into the penis. This makes it difficult to achieve or maintain an erection. More than three-quarters of impotence cases are caused by organic (physical) factors.[41].

Cancer can also cause sexual dysfunction. Around 13% of newly diagnosed cancer cases occur in people younger

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

than 44 years old. Some cancers cause temporary or permanent sexualproblemsorreducedfertility.[30].

Lifestyle factors also play a major role in sexual dysfunction. Obesity is a major risk factor for ED and infertility in men. Overweight and obesity are present in about 79% of men who report ED. Obesity is also linked with other diseases such as diabetes and cardiovascular problems, which further increase the risk of ED. Some studies suggest that obese men may have less frequent sexual intercourse, which may contribute to reduced fertility.[46]

Alcohol is another major factor. Heavy or long-term alcohol consumption affects all stages of sexual response. Chronic alcoholism can cause hormonal problems and nerve damage, which weaken communication between the brain and the penis. High alcohol intake causes sedation, lossofdesire.[47].

VIII. CHALLENGES AND LIMITATIONS

Understanding the physiology of sex and synthesizing recent literature in this domain presents several substantial challenges and limitations. Sexual physiology is inherently complex, involving the interaction of neurological, vascular, endocrine, and psychological systems. As research in this area spans multiple disciplines—clinical medicine, endocrinology, reproductive biology, neuroscience, psychology, and public health—there are unavoidable methodological difficulties, ethical constraints, and practical barriers that affect the scope and quality of available evidence.[48] This section critically examines the major challenges and limitations encountered in studying sexual physiology and in conducting a comprehensive literature review on this topic.[49]

One of the foremost challenges in sexual physiology research is the multidimensional nature of sexual function. Sexual responses are influenced not only by biological mechanisms but also by emotional, relational, social, and environmental factors. These dimensions are difficult to separate experimentally. For example, erectile dysfunction or reduced libido may stem from vascular insufficiency, hormonal disturbances, psychological stress, interpersonal difficulties, or medication side-effects. Many studies evaluate only one aspect of sexual function, without considering interconnected pathways. This creates lacunae in understanding the true integrative physiology underlying sexual responses.[50]

A second challenge arises from the subjectivity and variability of sexual experiences among individuals. Sexual desire, satisfaction, arousal, and orgasm are influenced by personal preferences, cultural norms, gender identity, and socio-emotional context. Unlike parameters such as blood glucose or blood pressure, sexual functioning cannot be measured with a single objective biomarker. Although validated questionnaires such as the International Index of Erectile Function (IIEF) or the Sexual Health Inventory for Men (SHIM) exist, they rely heavily on self-report, which may be affected by recall bias,[51] social desirability bias, or embarrassment. This limits the reliability of cross-study comparisons and complicates meta- analytic synthesis.[52]

This review relies on indirect assessments, observational methods, or animal models. While animal studies provide valuable insights into neural and hormonal mechanisms, they cannot fully replicate the complexity of human sexual behavior, especially its cognitive and emotional components. Thus, translating findings from in vivo and in vitro models to human physiology remains a challenge.[53]

Another obstacle is the scarcity of mechanistic studies exploring the underlying molecular and cellular pathways of sexual function. While the literature includes numerous clinical observations and epidemiological surveys, in-depth laboratory research remains limited due to ethical restrictions, difficulty obtaining human tissue samples, and limited funding for sexual health research. As a result, gaps persist in understanding the precise roles of neurotransmitters, ion channels, endothelial pathways, androgen receptors, and genetic factors in modulating sexual responses..[3,43]

IX. CONCLUSION

The physiology of sex is a complex and multidimensional field that integrates neurological, vascular, hormonal, psychological, and relational components. The recent literature reviewed in this article highlights that sexual function cannot be attributed to a single system or mechanism but is instead the outcome of intricate interactions among various biological and psychosocial factors. Over the past several years, significant progress has been made in understanding the molecular, cellular, and systemic mechanisms underlying sexual arousal, erectile function, libido regulation, and reproductive capability. These advancements have deepened scientific insight into how the nervous system, endocrine pathways, vascular integrity, and emotional health collectively contribute to healthy sexual function.

In conclusion, the physiology of sex remains a dynamic and evolving field. The recent literature provides valuable insights into the mechanisms governing sexual function and the diverse factors that contribute to sexual dysfunction. However, substantial gaps remain, calling for more comprehensive and interdisciplinary research. A deeper and more integrative understanding of sexual physiology will not only enhance scientific knowledge but also support more effective prevention, diagnosis, and treatment strategies for sexual dysfunction. Ultimately, such advancements will contribute to improving reproductive health, emotional well-being, and overall quality of life.

REFERENCES

[1]. Hudec S, Spacek M, Hutyra M, Moravec O, Taborsky M. Sexual activity and cardiovascular disease, erectile dysfunction as a predictor of ischemic heart disease. Cor Vasa. 2018;60(3): e296-e305. doi:

10.1016/j.crvasa.2017.08.006.
[2]. Caretta N, Feltrin G, Tarantini G, et al. Erectile dysfunction, penile atherosclerosis, and coronary artery vasculopathy in heart transplant recipients. J Sex Med. 2013;10(9):2295-2302. doi:10.1111/jsm.12233.
[3]. Kakde RK, Kale NR, Sanap G. Review on Immunological Perspectives and Therapeutic Management Strategies for COVID-19. J Res Appl Sci Biotechnol. 2024;3(5):246-257. doi:10.55544/jrasb.3.5.25.
[4]. Tan HM, Tong SF, Ho CCK. Men's health: Sexual dysfunction, physical, and psychological health-is there a link? J Sex Med. 2012;9(3):663-671. doi:10.1111/j.1743-6109.2011. 02582.x.
[5]. Laddha SS, Sanap GS, Nagari AV, Road M. Emergency Contraceptive Pills – A Review Gajanan S Sanap *, Sachin S Laddha, Antariksha Singh Ideal College of Pharmacy and Research, Bhal, Kalyan, India. 2011;2(1):27-33.
[6]. Thorat AN, Kathar NP, Sanap GS, Bodkhe MS. Review: Bilayer Tablet Is a New Approach. 2023;12(5):1028-1047. doi:10.20959/wjpps20235-24788.
[7]. Schnatz PF, Whitehurst SK, O'Sullivan DM. Sexual dysfunction, depression, and anxiety among patients of an inner-city menopause clinic. J Women's Heal. 2010;19(10):1843-1849. doi:10.1089/jwh.2009.1800.
[8]. Sanap GS, Mohanta GP, Kharche A, Khuspe P, Vidhate B. Novel Carriers in Topical Antifungal Therapy of Miconazole. World J Pharm Res. 2016;5(3):553-569.
[9]. Teoh JBF, Yee A, Danaee M, Ng CG, Sulaiman AH Bin. Erectile Dysfunction among Patients on Methadone Maintenance Therapy and Its Association with Quality of Life. J Addict Med. 2017;11(1):40-46. doi:10.1097/ADM.0000000000000267.
[10]. Dalvi K, Jadhav S, Sanap G, et al. Volatile Components of Essential Oils of Selected Plants: Comprehensive Review. World J Pharm Res www.wjpr.net │. 2015;11(4):448. doi:10.20959/wjpr20224-23472.
[11]. Sheweita SA, Wally M, Hassan M. Erectile Dysfunction Drugs Changed the Protein Expressions and Activities of Drug-Metabolising Enzymes in the Liver of Male Rats. Oxid Med Cell Longev. 2016;2016. doi:10.1155/2016/4970906.
[12]. Shinde A, Kale A, Wagh S, et al. Formulation of essential oil based on solid perfume. World J Pharm Med Res. 2024;10(7):191-196. www.wjpmr.com.
[13]. Dhapse PD, Sawle N, Kale NR, Sanap G, Shivshankar M. PELLETS IN PHARMACEUTICALS: AN OVERVIEW OF PELLETIZATION TECHNIQUES AND EXCIPIENTS FOR OPTIMIZED DRUG DELIVERY. 2025;10(1):97-114.
[14]. Dorle MD, Bhivasane A, Sanap GS. Review: Cutaneous Mucormycosis. 2023;12(7):57-69. doi:10.20959/wjpr20237-27831
[15]. - A lokhande, - N kale, - G sanap. A Review on Comorbidity of Diabetes Mellitus. Int J Multidiscip Res. 2025;7(1):1-14. doi:10.36948/ijfmr. 2025.v07i01.33304.
[16]. Napagoda M, Witharana S. Nanotechnology in Drug Delivery. Nanotechnol Mod Med. 2022;12(1):47-73. doi:10.1007/978-981-19-8050-3_3.
[17]. Patil DR, kale NR, Sanap G, et al. Ai in Polycystic Ovary Syndrome: Revolutionizing Diagnosis and Management. Int J Multidiscip Eng Curr Res. 2025;10(1):37-46. http://ijmec.com/,
[18]. Malviya N, Malviya S, Jain S, Vyas S. A review of the potential of medicinal plants in the management and treatment of male sexual dysfunction. Andrologia. 2016;48(8):880-893. doi:10.1111/and.12677.
[19]. Sanap GS, Sawant VA, Shende VS, et al. Anti-hyperglycemic and antioxidant activities of the Mehari choornam. Res J Pharm Technol. 2010;(2):402-405.
[20]. Ujah GA, Nna VU, Agah MI, Omue LO, Leku CB, Osim EE. Effect of quercetin on cadmium chloride-induced impairments in sexual behaviour and steroidogenesis in male Wistar rats. Andrologia. 2018;50(2). doi:10.1111/and.12866.
[21]. Gadekar NK, Raut PS, Mokale B, Sanap GS. Review: on Cucumis Callocus. Certif J │ Gadekar al World J Pharm Res. 2023;12(5):2109-2120. doi:10.20959/wjpr20235-27734.
[22]. Trajanovska AS, Vujovic V, Ignjatova L, Janicevic-Ivanovska D, Cibisev A. Sexual dysfunction as a side effect of hyperprolactinemia in methadone maintenance therapy. Med Arh. 2013;67(1):48-50. doi:10.5455/medarh.2013.67.48-50.
[23]. Abhijit Kumbhakar, Shaikh Suleman, Dr. Rana Zainuddin Ahmed, Kale Nitin. Topical Fibronectin Improves Wound Healing in Postmastectomy Breast Cancer Radiation Therapy: A Review. Int J Sci Res Sci Technol. 2024;11(2):469-482. doi:10.32628/ijsrst52411291.
[24]. Sanap G, Dama G, Hande A, et al. Preparation of Transdermal Monolithic Systems of Indapamide by Solvent Casting Method and the Use of Vegetable Oils as Permeation Enhancer. Vol 2.; 2008. doi:10.4103/0973-8258.41189.
[25]. Vishal Dnyaneshwar Kalatre, Mrs. Nitin R. Kale, Dr Gajanan Sanap. A Review on Transdermal Drug Delivery System (TDDS). Int J Adv Res Sci Commun Technol. Published online 2024:226-232. doi:10.48175/ijarsct-18137.
[26]. Gerra G, Manfredini M, Somaini L, Maremmani I, Leonardi C, Donnini C. Sexual Dysfunction in Men Receiving Methadone Maintenance Treatment: Clinical History and Psychobiological Correlates. Eur Addict Res. 2016;22(3):163-175. doi:10.1159/000441470.
[27]. Dhamale P, Pardhe AT, Manikpuriya S, et al. Formulation and Evaluation of Herbal Cream Containing Extracts of Hyptis Suaveolens and Murraya Koenigii. Certif J │ Dhamale al World J Pharm Res 1725 World J Pharm Res SJIF Impact Factor 8084. 2023;12(9):1726. doi:10.20959/wjpr20239-28113.
[28]. Sanap GS, Mohanta GP. Development of miconazole nitrate-controlled release formulations based on sln and NLC for topical delivery. Int J Pharm Pharm Sci.

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan187

2014;6(4):393-399.
[29]. Sanap GS. International Journal of Research Publication and Reviews Therapeutic Role of Euphorbia Nerifolia their Active Constituents and Pharmacological Activity in Disease prevention and T ... International Journal of Research Publication and Reviews Therapeutic. 2024;4(April 2023):1584-1595.
[30]. Edey MM. Male sexual dysfunction and chronic kidney disease. Front Med. 2017;4(MAR). doi:10.3389/fmed.2017.00032
[31]. Raut PS, Gadekar NK, Mokale B, Sanap G. Review on Momordica Dioica. Certif J │ Raut al World J Pharm Res. 2023;12(5):2295. doi:10.20959/wjpr20235-27733.
[32]. RJPT - Sexual Dysfunction in Men with Diabetes Mellitus.
[33]. Ghadge RN, Parhad MB, Sanap GS. Review: Niosomal Drug Delivery Systems. 2023;12(5):680-691. doi:10.20959/wjpr20235-27583.
[34]. Dursun M, Besiroglu H, Otunctemur A, Ozbek E. Association between cardiometabolic index and erectile dysfunction: A new index for predicting cardiovascular disease. Kaohsiung J Med Sci. 2016;32(12):620-623. doi: 10.1016/j.kjms.2016.10.003.
[35]. Sanap GS, Mohanta GP. Solid lipid nanoparticles (SLN) -based hydrogel formulation for topical delivery of miconazole nitrate. Int J Pharma Bio Sci. 2013;4(2):21-33.
[36]. Gaikwad AP, Parhad MB, Sanap GS, Gaikwad Late Bhagirathi Yashwantrao Pathrikar AP. Review: Herbal Antidiabetic Drug. Certif J │ Gaikwad al World J Pharm Res. 2023;12(5):1920-1931. doi:10.20959/wjpr20235-27701
[37]. Prabhakaran D, Nisha A, Varghese P. Prevalence and correlates of sexual dysfunction in male patients with alcohol dependence syndrome: A cross-sectional study. Indian J Psychiatry. 2018;60(1):71-77. doi: 10.4103/psychiatry.IndianJPsychiatry_42_17.
[38]. Sanap G. A Review: Solid Lipid Nanoparticle A Potential Drug Delivery Carrier. Int J Chem Pharm Anal. 2014;1(2):52-62. https://pmindexing.com/journals/index.php/IJCPA/article/view/158.
[39]. Karabakan M, Bozkurt A, Akdemir S, Gunay M, Keskin E. Significance of serum endothelial cell specific Molecule-1 (Endocan) level in patients with erectile Dysfunction: A pilot study. Int J Impot Res. 2017;29(4):175-178. doi:10.1038/ijir.2017.19.
[40]. S SG. Formulation and evaluation of mucoadhesive beads of glipizide using 2 3 factorial design. 2009;2(5):934-938.
[41]. Chen L, Shi G rui, Huang D dan, et al. Male sexual dysfunction: A review of literature on its pathological mechanisms, potential risk factors, and herbal drug intervention. Biomed Pharmacother. 2019;112. doi: 10.1016/j.biopha.2019.01.046.
[42]. Swami NB, Sanap GS. Diabetic Retinopathy: a Sight-Threatening Complication of Diabetes Mellitus. Certif J │ Swami al World J Pharm Res. 2024;13(1):349-376. doi:10.20959/wjpr20241-30684.
[43]. US8669242B2 - Use of testosterone and a 5-HT1A agonist in the treatment of sexual dysfunction - Google Patents.
[44]. Sanap GS, Mohanta GP. Design and evaluation of miconazole nitrate loaded nanostructured lipid carriers (NLC) for improving the antifungal therapy. J Appl Pharm Sci. 2013;3(1):46-54. doi:10.7324/JAPS.2013.30109.
[45]. Bodkhe MAB, Mokle MBA, Sanap G. Lumpy skin disease: An Overview. Int J Creat Res Thoughts. 2023;11(3):174-183. https://www.researchgate.net/publication/369139678.
[46]. Murkute PS, Raut RS, Kathar NP, Sanap GS, Gaikwad RG. Brief Introduction to In-Silico Drug Discovery Process and Virtual Screening Method; Ubiquitination Regulator in Cancer: A Review. Int J Res Trends Innov. 2022;7(3):31-40.
[47]. Síndrome metabólica e disfunção eréctil - avaliação de parâmetros clínicos e hemodinâmicos - ScienceDirect.
[48]. WAKODKAR RR, SANAP G, FAROOQUI M, KAYANDE DD. A Facile Synthesis of 6-Amino-4-Aryl-3-Methyl-2,4- Dihydropyrano [2,3-C] Pyrazole-5-Carbonitriles in Aqueous Medium. J Ultra Chem. 2018;14(02):50-56. doi:10.22147/juc/140201.
[49]. Author C, Bansod BB, Goukonde R, Sanap G. A Review on Acacia Arabica and It's Medicinal Uses. Int J Pharm Sci. 2024;01(12):1-1. doi:10.5281/zenodo.10443939.
[50]. Seftel AD. Re: Testosterone Therapy for Sexual Dysfunction in Men with Type 2 Diabetes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Urol. 2018;199(5):1096. doi: 10.1016/j.juro.2018.02.057.
[51]. Mohanrao Sonawane V, Hatwar P, Sanap G, Mohanrao Sonawane LBY V. Protein Fiber in Drug Delivery System. Certif J │ 785 World J Pharm Res SJIF Impact Factor 8084. 2023;12(22):786. doi:10.20959/wjpr202322-30680.
[52]. Shi GJ, Li ZM, Zheng J, et al. Diabetes associated with male reproductive system damages: Onset of presentation, pathophysiological mechanisms and drug intervention. Biomed Pharmacother. 2017; 90:562-574. doi: 10.1016/j.biopha.2017.03.074.
[53]. Pruss CM, Twofoot MTM, Ross R, Adams M. The positive impact of exercise on endothelial and sexual dysfunction in sedentary overweight individuals. J Sex Med. 2014; 11:148-149.http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L71682775%0Ahttp://dx.doi.org/10.1111/jsm.12528.
[54]. Sanskruti Pawar, Shubhangi Manikpuriya, Gajanan Sanap. The Phytochemical and Pharmacological Screening of Withania Coagulans. World J Biol Pharm Heal Sci. 2023;16(3):109-117. doi:10.30574/wjbphs.2023.16.3.0501.