



# Exploring Trends in Erectile Dysfunction Research from 2017 to 2023: A Focus on COVID-19, Mental Health, Psychiatry, and Drug

Yoshiyasu Takefuji<sup>1</sup>

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## Abstract

This paper investigates the trends in erectile dysfunction research by integrating individual keywords such as COVID-19, mental health, psychiatry, and drug use. The study spans a six-year period from September 21, 2017, to September 21, 2023, and utilizes resources from the National Library of Medicine. For instance, the quantity of relevant documents is determined using the Google search engine. A custom date range can be set on the browser via tools, and the search is limited to the nih.gov site domain. The phrase-site search command used is executed with “erectile dysfunction” COVID-19 site:nih.gov. The result revealed that from Sept 2021 to 2022, research on COVID-19 and erectile dysfunction spiked. However, the previous year saw a rise in studies linking drugs or mental health with erectile dysfunction. Meanwhile, psychiatry-focused publications have consistently grown. The time-series trends of erectile dysfunction linked to COVID-19 are substantiated by a comprehensive literature review.

**Keywords** Erectile dysfunction · Trends · National library of medicine · Japan

This study explores patterns in erectile dysfunction research by incorporating specific keywords such as COVID-19, mental health, psychiatry, and drug use. The research covers a six-year timeframe from September 21, 2017, to September 21, 2023, and employs resources from the National Library of Medicine (NLM). The number of pertinent documents is ascertained using the Google search engine. A specific date range can be established in the browser through tools, and the search is confined to the nih.gov site domain (NLM). For example, the search command used is “erectile dysfunction” COVID-19 site:nih.gov. A

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✉ Yoshiyasu Takefuji  
takefuji@keio.jp

<sup>1</sup> Faculty of Data Science, Musashino University, 3-3-3 Ariake Koto-ku, Tokyo 135-8181, Japan

total of 24 literature reviews were conducted with NLM database over a span of six years, from 2017 to 2023, using four keywords: COVID-19, mental, psychiatry, and drug.

Figure 1 illustrates the trends in erectile dysfunction research using combined keywords such as COVID-19, mental health, psychiatry, and drug. A surge in research related to COVID-19 and erectile dysfunction is noticeable from September 21, 2021, to September 21, 2022. Conversely, a peak in research combining drugs or mental health with erectile dysfunction is observed from September 21, 2020, to September 21, 2021. The number of documents focusing on psychiatry has been steadily increasing over this period.

A literature review was conducted on the topic of erectile dysfunction, utilizing a combination of keywords such as “drug”, “COVID-19”, “mental” and “psychiatry” with the NLM to substantiate the impact of COVID-19, mental health, psychiatry, and drug on erectile dysfunction.

Kalra et al. reported that male hypogonadism (MH), a syndrome caused by inadequate testosterone synthesis, affected 20-29% of Indian men over 40 and 20.7% of men with type 2 diabetes [1]. Despite its prevalence, MH is underdiagnosed due to poor patient-physician communication. Testosterone replacement therapy is recommended for MH, but optimal treatment is challenging due to individual needs and lack of standardized guidelines [1].

The European Society of Sexual Medicine (ESSM) emphasized a multidisciplinary approach to treating erectile dysfunction (ED), combining medical treatment with psychological techniques [2]. These techniques aimed to reduce anxiety, challenge dysfunctional beliefs, increase sexual stimulation, disrupt sexual avoidance, and enhance intimacy and communication. Including the partner in the treatment process is strongly recommended. Despite the effectiveness of this approach, more research is needed to improve the quality of studies and promote diversity and inclusivity in treatments [2].

A review of studies found a high prevalence (median 20.0%) of ED among men with anxiety disorders, with ED severity ranging from mild to moderate [3]. The disorders investigated included PTSD, OCD, social phobia, and panic disorder. Despite these findings, more research is needed due to high heterogeneity among the studies [3].

Xiao et al. investigated that a study of 511 Chinese patients with ED found a high prevalence of anxiety (38.16%) and depression (64.97%) [4]. Factors associated with increased risk of anxiety and depression included worse ED, low education level, smoking, younger age, longer onset time, irregular sleep, and lack of regular exercise. Their study suggested the need for individualized psychological support for ED patients [4].

Ciacchio et al. studied and highlighted the neglected area of sexual dysfunction in under-40s, emphasizing the role of psychological factors like anxiety, depression, and relational conflicts [5]. Their study advocated for a multidisciplinary approach involving medical doctors and psychosexologists to improve disorder recognition and treatment effectiveness. However, current literature lacks sex education programs and multidisciplinary therapies [5].

A study of 2,660 sexually active U.S. men aged 18–31 found that 11.3% reported mild ED and 2.9% reported moderate-to-severe ED [6]. Married/partnered men had 65% lower odds of ED compared to single men. Antidepressant use, anxiety, and tranquilizer use were associated with higher odds of moderate-to-severe ED. Despite the prevalence, only 2% reported using ED medication or supplements [6].

The article authored by Malhi and colleagues, which is a part of a series dedicated to sexual wellbeing, delves into the psychosocial factors that can adversely influence sexual

wellbeing and lead to ED [7]. Their article outlined foundational principles regarding these factors, particularly in individuals with mental illness. Neurophysiological factors were discussed in a future article [7].

Hu et al. reported that a study of 67 male COVID-19 recovered patients found that psychological distress and ED were common within 80 days of recovery [8]. However, after approximately 174 days, these symptoms improved significantly. Their study suggested that psychological and sexual support may be beneficial for COVID-19 recovered patients [8].

A review of 693 publications found compelling evidence that COVID-19 infection increases the likelihood of ED through biological, mental health, and healthcare access mechanisms [9]. Their study identified four key areas: biological impact of COVID-19 on ED, mental health impact, impact on ED management and treatment access, and health disparities. Their study called for long-term studies to clarify the extent of COVID-19's impact on ED [9].

Sansone et al. reported that long COVID, the long-term complications of COVID-19, can affect almost all body systems and significantly impair quality of life [10]. These complications can also impact sexual health, particularly ED. Common issues include "brain fog", fatigue, neuropsychiatric complications, respiratory and cardiovascular problems, and endocrine manifestations. The study suggests that ED could serve as a biomarker for the severity of long COVID and its follow-up [10].

A review of 5392 studies found that male sexual dysfunctions (MSDs) are often undiagnosed and untreated in Asia compared to Europe due to cultural, socioeconomic, and awareness factors [11]. The prevalence of erectile dysfunction, low satisfaction, and hypoactive sexual desire disorder was higher in Asian men, while anorgasmia was lower. Age, single status, low socioeconomic status, poor health, less physical activity, certain diseases, anxiety, depression and substance use were significant factors [11].

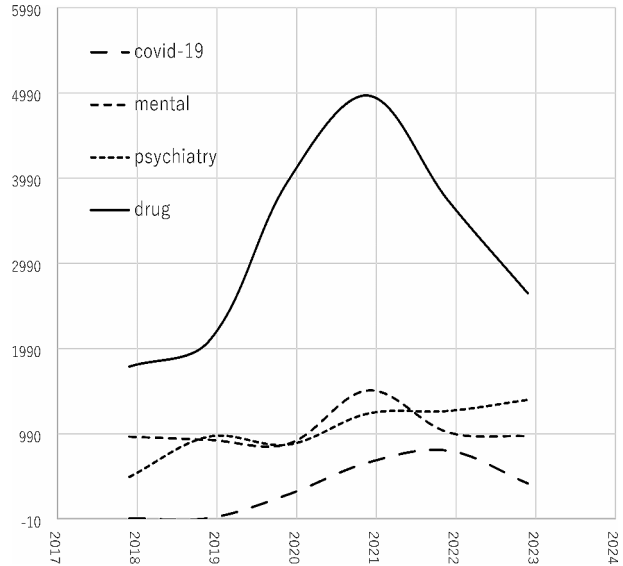
ED, a condition affecting a man's ability to achieve or maintain an erection, was expected to impact 322 million men by 2025 [12]. Its incidence increased with age and comorbidities like diabetes, metabolic syndrome, psychiatric diseases, and hypertension. This review discussed the management of ED in hypertensive men and its predictive role in cardiovascular disease [12].

The Italian Society of Andrology and Sexual Medicine released updated guidelines on diagnosing and managing ED, acknowledging its organic causes [13]. The guidelines, based on a multidisciplinary approach, recommend lifestyle changes, pharmacotherapies, counseling, and a couple-centered approach. They recognized oral therapy with phosphodiesterase type 5 inhibitors as the gold standard and discuss new or controversial therapies. These guidelines aimed to improve sexual satisfaction and overall health [13].

Stratton et al. reported that various medications and recreational substances can influence a man's sexual arousal and performance [14]. What triggers erectile issues in one individual may not impact another. They summarized a list of some medications and substances that could potentially cause ED in men. Their list is not exhaustive, and other drugs not included here may also cause ED [14].

In line with the current decision of the NIH, Desai et al. concluded from their research findings that there is no supporting evidence for the hypothesis that phosphodiesterase-5 inhibitors, such as sildenafil and tadalafil, can decrease the incidence of Alzheimer's disease [15]. Their study, which controlled 76 confounding variables, found no reduced risk of Alzheimer's disease with these inhibitors. Additionally, sildenafil did not appear to alleviate

**Fig. 1** Trends of erectile dysfunction research with combined individual keywords such as COVID-19, mental, psychiatry and drug from September 21, 2017 to September 21, 2023



molecular abnormalities relevant to Alzheimer's disease in most cell culture-based assays [15].

A review of studies found a high prevalence (median 20.0%) of ED among men with anxiety disorders, with ED severity ranging from mild to moderate where mental disorders are strongly associated with COVID-19. The findings of the review explored the psychosocial elements that can negatively impact sexual health and result in ED. These findings established basic tenets related to these elements, especially in people suffering from mental disorders. A range of medications and recreational substances during the long COVID-19 can affect a man's sexual arousal and performance. However, what triggers erectile dysfunction in one man may not have the same effect on another. The researchers provided a comprehensive list of certain medications and substances that could potentially lead to erectile dysfunction in men. The results of the literature review suggested that COVID-19 is strongly associated with mental health, psychiatry and drug use which can cause erectile dysfunction. To put it differently, as depicted in Fig. 1, the literature review corroborates the trends observed in erectile dysfunction research that utilized a combination of keywords such as COVID-19, mental health, psychiatry, and drug.

Male sexual dysfunction is common, affecting millions of men worldwide. Psychosocial factors, such as anxiety, depression, and relationship problems, play a significant role. COVID-19 infection can also increase the likelihood of sexual dysfunction. Early diagnosis and treatment are important to improve men's sexual health and overall well-being. A multidisciplinary approach, combining medical treatment with psychological techniques, is often recommended.

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**Data Availability** Not applicable.

## Declarations

**Conflict of Interest** The author has no conflict of interest.

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