

## Sleep-Related Painful Erections: A Meta-Analysis on the Pathophysiology and Risks and Benefits of Medical Treatments



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### ABSTRACT

**Background:** Patients with sleep-related painful erections (SRPEs) have frequent awakenings from deep penile pain during nocturnal erections. This results in severe sleep deprivation.

**Aim:** To review the current literature on SRPEs and discuss the pathophysiologic theories and risks and benefits of medical treatments.

**Methods:** PubMed was searched using the terms *sleep-related painful erections*, *nocturnal priapism*, *treatment*, and *sleep-related erections*.

**Outcome:** Variables included patient demographics, medical history, diagnostics, hypotheses on pathophysiology, and treatment modalities and their effect on SRPE in the short and long term.

**Results:** The search yielded in 66 SRPE cases that were analyzed, including our mono-institutional series of 24 patients. The phenomenon of SRPEs is not well understood. Theories about pathophysiology concerned increased serum testosterone levels, altered autonomic function, compression of the lateral preoptic area, coexistent obstructive sleep apnea syndrome, the existence of a “compartment syndrome,” and psychosomatic factors. Except for polysomnographic findings that showed sleep fragmentation and decreased sleep efficiency in all patients, other diagnostic results varied widely. Multiple agents were tried. Baclofen and, to lesser degree, clonazepam showed noticeable results, most likely due to their influence on the  $\gamma$ -aminobutyric acid system and, hence, suppression of glutamate release. In addition, baclofen relaxes the ischiocavernosus and bulbospongiosus muscles, which are involved in penile erection.

**Clinical Implications:** By providing a critical analysis and complete overview on the limited literature about this overlooked and undermanaged condition, this review contributes to a better understanding of the pathophysiology and provides directions for future research on the treatment of SRPE.

**Strengths and Limitations:** Because the literature on SRPEs includes only case reports and small case series, the level of evidence of treatment advice is limited.

**Conclusion:** The pathophysiology of SRPEs is not yet clarified. Further diagnostic evaluation, including electromyography of the ischiocavernosus and bulbospongiosus muscles to elucidate the pathophysiology, is recommended. Prospective controlled investigations are warranted to assess the efficacy and safety of long-term use of baclofen and develop evidence-based treatment advice. **Vreugdenhil S, Weidenaar AC, de Jong IJ, van Driel MF. Sleep-Related Painful Erections: A Meta-Analysis on the Pathophysiology and Risks and Benefits of Medical Treatments. J Sex Med 2018;15:5–19.**

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**Key Words:** Sleep-Related Painful Erection; Parasomnia; Humans;  $\gamma$ -Aminobutyric Acid; Baclofen; Nocturnal Erection; Priapism; Treatment

### INTRODUCTION

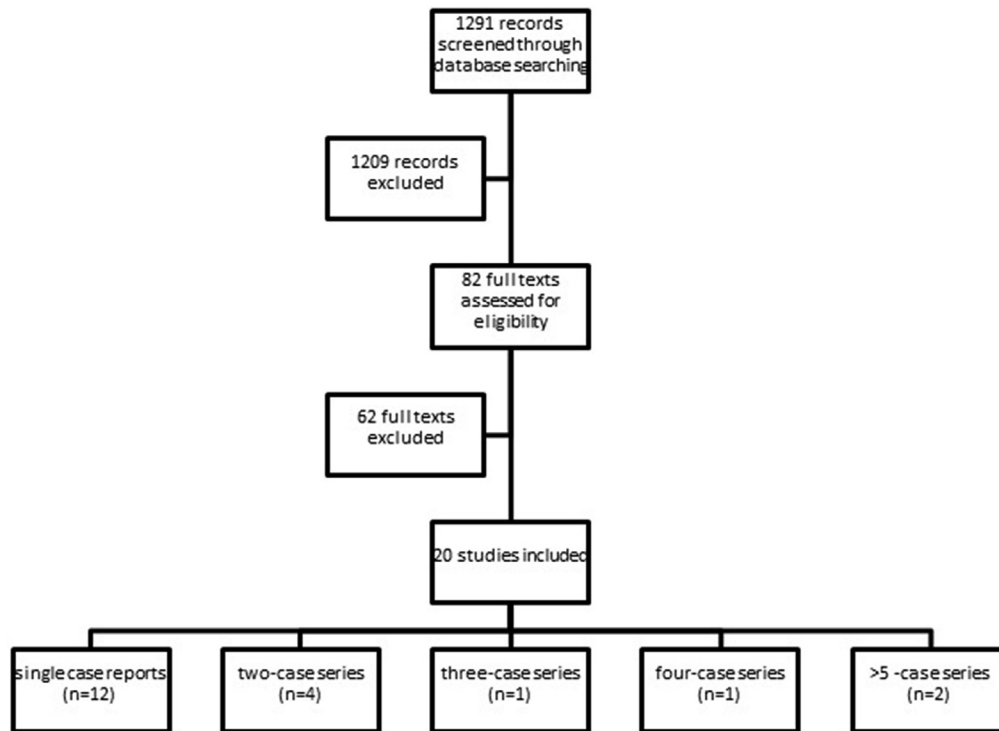
The International Classification of Sleep Disorders of the American Academy of Sleep Medicine defines sleep-related painful erections (SRPEs) as “penile pain that occurs during erections, typically during rapid eye movement (REM) sleep episodes.”<sup>1</sup> Patients with SRPEs report frequent awakenings related to this deep penile pain. The awakenings and REM sleep

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**Figure 1.** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of literature reviewing process.

fragmentation can result in anxiety, tension, irritability, and daytime fatigue. Typically, patients report no pain during erections related to sexual activity. Most present with persistent complaints deriving from sleep deprivation and have a mean patient-doctor delay between onset and diagnosis of several years. Common urologic disorders as Peyronie's disease and phimosis can be present but their clinical presentation is clearly different and they do not explain SRPEs.<sup>2</sup>

SRPEs belong to the so-called parasomnias, which can be defined as undesirable physical phenomena, events (movements, behaviors), or experiences (emotions, perceptions, dreams) that occur while falling asleep, being asleep, or while waking up.<sup>3</sup>

Diagnostics and management options for SRPEs are not clearly defined. The aim of this study was to review the current literature regarding hypotheses that concern the pathophysiology and to discuss diagnostics and risks and benefits of medical treatment options.

## METHODS

A systematic search was conducted to identify all the literature on SRPE. We searched the electronic database PubMed using the terms *sleep-related painful erections*, *nocturnal priapism*, *treatment*, and *sleep-related erection*. In addition, we manually scanned the reference list of all articles and examined those that seemed relevant. The search covered articles published from 1972 to August 2016. No language restrictions or methodologic filters were implemented to maximize the sensitivity of the searches. Results were described in a descriptive manner. Study

reporting follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).<sup>4</sup>

## Selection of Studies and Quality Assessment

1,291 articles were screened by title and abstract during the database search, of which 82 full texts were assessed for eligibility. No restrictions on level of evidence were applied. Because the search yielded only retrospective and descriptively evaluated case reports and small case series, no checklists could be used to assess the methodologic quality of the studies (Figure 1).

## RESULTS

Our search yielded 19 articles including 44 cases with SRPEs, which were reported in a mono-institutional case series of 17 patients,<sup>5</sup> 12 single case reports,<sup>6–17</sup> 4 2-case series,<sup>2,18–20</sup> 1 3-case series,<sup>21</sup> and 1 4-case series.<sup>22</sup> 1 2-case report written in the Korean language was excluded. Data were supplemented by our recent mono-institutional series of 24 patients<sup>23</sup> (Table 1). In the latter, 2 patients overlapped the 4-case series described by Van Driel et al<sup>22</sup> in 2008. Because the included studies were confined to retrospectively described case studies, the risk of bias is presumed to be high and the level of evidence is presumed to be no higher than IV to V (Table 1).

Theories about the pathophysiology of SRPEs concerned increased serum testosterone levels,<sup>23</sup> altered autonomic function,<sup>24</sup> compression of the lateral preoptic area,<sup>10</sup> coexistent obstructive sleep apnea syndrome,<sup>2,17</sup> the existence of a “compartment syndrome,”<sup>23</sup> and psychosomatic factors.<sup>18,21</sup>

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