

## Severity of Erectile Dysfunction in Thai Male Patients with Spinal Cord Injury

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### ABSTRACT

**Objectives:** To examine severity of erectile dysfunction (ED) among Thai male patients with spinal cord injury (SCI) and relevant clinical data.

**Study design:** A retrospective study.

**Setting:** Sexual clinic, Sirindhorn National Medical Rehabilitation Institute, Nonthaburi, Thailand.

**Subjects:** Sixty-two Thai male patients with traumatic SCI.

**Methods:** The participants' age, duration and level of SCI, relationship status before and after injury, family planning particularly their child wanting, bladder management and catheterization technique, the 5 International Index of Erectile Function (IIEF-5), frequency of sexual intercourse, history of taking oral medications for ED, and ejaculation were retrieved from their medical records.

**Results:** The mean age was 34 years old and duration of SCI was 50 months. Among all, 60% was complete paraplegia, 16% incomplete tetraplegia, 13% complete tetraplegia and 11% incomplete paraplegia; 77% had partners. Regarding bladder management, 11 (36%) used indwelling urinary catheter and had no sexual activity whereas 51 (64%) managed the bladder by themselves and 31 (61%) had regular sexual intercourse. Of those having regular sexual intercourse, 42% used phosphodiesterase type 5 (PDE5) inhibitors. Based on their IIEF-5 scores, 18 patients (35%) with regular sexual intercourse and not taking PDE5 inhibitor, were classified into 5 different severity levels: mild erectile dysfunction (33%), followed by mild to moderate (22%), moderate (22%), severe (17%) and no ED (5%). The prevalence of ED in sexually-active patients was 94% (17 out of 18 patients).

**Conclusion:** About 35% of Thai SCI men attending a sexual clinic were sexually active without need of PDE5 inhibitor; and among them, one-third had mild erectile dysfunction. All using indwelling urinary catheter had no sexual activity. Preserving their intimate relationship and the use of PDE inhibitors might help impel their sexual activity.

**Keywords:** spinal cord injuries, erectile dysfunction, prevalence, sex, male

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### Introduction

Spinal cord injury (SCI) is a destructive spinal cord that contusion is the most common gross finding.<sup>1</sup> SCI can be categorized into traumatic and non-traumatic according to the causes of injury. Traumatic SCI can be caused by spinal fracture or dislocation from trauma, whereas spinal tumor, vascular ischemia, spinal stenosis, congenital or inflammatory diseases can cause non-traumatic SCI.<sup>2</sup> The incidence of traumatic SCI in Thailand between the years 1989 and 1994 was 23 cases per million per year which were mostly caused by road traffic accidents followed by falls.<sup>3</sup> Between 2008 and 2017, another study found that the average age of Thai patients with SCI was 45.1 years and 67.5% of them were male.<sup>4</sup> The most common site of their injury was cervical spine (54.2%), average length of stay was longest (96.2 days) in cervical complete SCI and mortality rate was 0.4%.<sup>4</sup> Complete injury is the most common type of severity and has the least neurological recovery rate.<sup>3-5</sup> In addition to the ambulation problems following SCI, there are many secondary long-term medical complications such as autonomic dysreflexia, orthostatic hypotension, impaired respiratory function, deep vein thrombosis, bowel and bladder dysfunction, recurrent urinary tract infections, neuropathic arthropathy, osteoporosis, bone fractures, neuropathic pain, spasticity and pressure sores.<sup>6-8</sup> Sepsis from pressure sores was found to be the most common cause of death among SCI patients.<sup>9</sup>

Infertility is also another important problem caused by SCI especially in male patients as inflammation and endocrine changes after injury can affect their spermatogenesis, erectile function and semen ejaculation.<sup>10,11</sup> It was found that only 10% of SCI male patients were able to have children without the help of assisted reproductive technology.<sup>12</sup> The impairment of neurological function can also cause psychogenic and/or reflexogenic erectile function based on level of injury. The reflexogenic erection was usually preserved when the lesion was found above the sacral cord.<sup>13</sup> A previous study

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reported that 82% of SCI patients could achieve some types of erection.<sup>14</sup> However, only 61% of them succeeded in having sexual intercourse, 38% had no sexual activity, and only 11% could ejaculate or reach orgasm.<sup>14</sup> Another previous survey study reported that regaining sexual function was the highest concern for quality of life among both male and female paraplegics, whereas arm recovery function was mostly important for quadriplegics.<sup>15</sup> In Thailand, a study of erectile dysfunction (ED) in SCI patients by Moonla et al. reported that only 28.6% had sufficient erection for sexual intercourse whereas 62.5% of them still had sexual desire.<sup>16</sup> This is in line with Sudsaneha et al. reporting that 84% of Thai chronic SCI men had some degree of ED.<sup>17</sup>

The International Index of Erectile Function (IIEF) is the standard diagnostic tool for ED assessment. The original version provides 15 questions divided into five sexual function domains: erectile function, orgasmic function, sexual desire, intercourse satisfaction and overall satisfaction.<sup>18</sup> The modified 5-item version of the International Index of Erectile Function (IIEF-5) focuses on erectile function and intercourse satisfaction, especially in men with regular sexual intercourse.<sup>19</sup> In men who reported having had no sexual activity, the score range, 5 to 7, for the severest category of ED will change to 1 to 7. This IIEF-5 has 98% sensitivity and 88% specificity in detecting ED<sup>19</sup> and the Thai version of IIEF-5 (IIEF5-Th) has high validity and reliability for ED analysis in Thai males.<sup>20</sup>

The mission of the sexual clinic at the Sirindhorn National Medical Rehabilitation Institute, Nonthaburi, Thailand is to provide family counseling focusing on sexual behavior and erectile function using multidisciplinary team including rehabilitation physicians (physiatrists), rehabilitation counselors and nurses. The Thai IIEF-5 was used for ED assessment in all male SCI patients at this clinic at their first visit and every follow-up session. However, few studies of this issue in Thailand has been conducted and none of them using the Thai IIEF-5 for ED evaluation.<sup>16,17</sup> Thus, the purposes of this research were to examine severity of erectile dysfunction among Thai male SCI patients in relation to their relevant history and IIEF-5 score.

## Methods

This study was approved by the Human Research Ethics Committee, Faculty of Medicine, Ramathibodi Hospital, Mahidol University and the Sirindhorn National Medical Rehabilitation Institute. Informed consent form was waived as this is a retrospective study and the data were retrieved from patients' history files at the clinic.

### Participants

Sixty-two male patients, aged over 15 years old, with SCI who came to the sexual clinic at the Sirindhorn National Medical Rehabilitation Institute (SNMRI), Nonthaburi, Thailand, for family counseling between January 2015 and October 2018 were recruited in this study. Almost all of the partici-

pants were sent to this clinic by other physicians when they were ready for sexual rehabilitation after their complete general SCI rehabilitation program. Male patients with other medical problems with erectile dysfunction were excluded.

The participants' history in terms of age, onset and level of injury, relationship status, family planning particularly their child wanting, bladder management and catheterization technique, IIEF-5 score, frequency of sexual intercourse, history of oral medications for erectile dysfunction, and ejaculation, meaning patients can ejaculate in orgasmic phase, were retrieved from their first medical files. The patients interested in assisted reproductive technology were recorded as "fertility treatment requirement", while those reporting "in relationship" or "married" were classified as "partner". These demographic and clinical data were considered characteristics of ED patients in this study and the sum IIEF-5 score of each patient was used to classify them into different levels of severity.

### Statistical analysis

Statistical analysis was performed using SPSS software version 18.0. The demographic and clinical data were compared among and between groups of severity by using ANOVA, Chi-square test and student's t-test. Statistical significance was defined by  $p < 0.05$ .

## Results

The demographic and clinical data of the overall 62 Thai male SCI patients are displayed in Table 1. The mean patient's age was 34 years old (range 16-57) and duration of injury was 50 months (range 4-187). There were 60% complete paraplegia, 16% incomplete tetraplegia, 13% complete tetraplegia and 11% incomplete paraplegia. It was found that 48 out of 62 patients (77%) had partners but only 31 (50%) had regular sexual intercourse.

**Table 1.** Demographic data of all 62 Thai male SCI patients

Age (years) <sup>1</sup>	34 (9.4)
Onset of SCI (months) <sup>1</sup>	50 (52)
Level of paralysis <sup>2</sup>	
- Complete paraplegia	37 (60)
- Incomplete paraplegia	7 (11)
- Complete tetraplegia	8 (13)
- Incomplete tetraplegia	10 (16)
Relationship status	
- No partner	14 (23)
- Partner	48 (77)
Parenting children	22 (35)
Smoking	20 (32)
Using indwelling urinary catheter	11 (36)
PDE5 inhibitor usage	14 (23)
Regular sexual intercourse	31 (50)
Ejaculation	8 (13)
Fertility treatment requirement	31 (50)

<sup>1</sup>Mean (SD), <sup>2</sup>number (%)

SCI, spinal cord injury; PDE5, phosphodiesterase type 5

The comparison between regular and no sexual intercourse in 51 patients who self-managed bladder is summarized in Table 2. Eleven SCI patients who used indwelling urinary catheter were not included due to no sexual activity from bladder issues. Statistically significant differences between these two groups were found in terms of relationship status ( $p < 0.001$ ) and the use of PDE5 inhibitors ( $p = 0.004$ ) while no statistical differences were found among other characteristics. 97% of patients who had regular sexual intercourse were in relationship, whereas only 50% in patients without sexual intercourse had partner. In addition, 39% had no sexual intercourse, 35% had sexual intercourse without use of PDE5 inhibitor, and 26% took PDE5 inhibitors (see Figure 1).

Table 3 compares the characteristics of IIEF-5 severity groups in 31 SCI patients with regular sexual intercourse. There were no statistically significant differences in terms of age, duration of SCI, level of paralysis, relationship status, parenting children, smoking, PDE5 inhibitor usage, ejaculation and fertility treatment requirement among these 5 groups of patients. The average sexual intercourse per month was lowest (1-2 times per month) in severe group.

**Table 2.** Characteristics comparison between regular and no sexual intercourse in 51 self-managed bladder patients

	Sexual intercourse		p-value
	Regular (n = 31)	No (n = 20)	
Age (years) <sup>1</sup>	34 (7.9)	33 (9.6)	0.719
Duration of SCI (months) <sup>1</sup>	67 (59.2)	39 (43.5)	0.206
Level of paralysis <sup>2</sup>			0.252
- Complete paraplegia	21 (68)	10 (50)	
- Incomplete paraplegia	4 (13)	2 (10)	
- Complete tetraplegia	1 (3)	4 (20)	
- Incomplete tetraplegia	5 (16)	4 (20)	
Relationship status			< 0.001
No Partner	1 (3)	10 (50)	
Partner	30 (97)	10 (50)	
Parenting children	11 (35)	6 (30)	
Smoking	10 (32)	7 (35)	
PDE5 inhibitor usage	13 (42)	1 (5)	
Ejaculation	6 (19)	2 (10)	
Fertility treatment requirement	19 (61)	10 (50)	

<sup>1</sup>Mean (SD), <sup>2</sup>number (%)

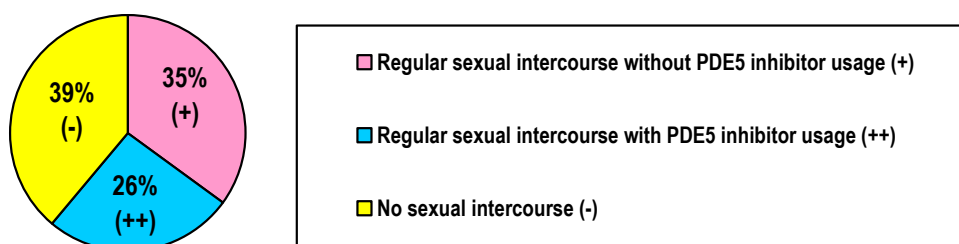
SCI, spinal cord injury; PDE5, phosphodiesterase type 5

**Table 3.** Severity of erectile dysfunction by IIEF-5 in 31 SCI patients with regular sexual intercourse

Severity of ED	Severe (n = 4)	Moderate (n = 7)	Mild to moderate (n = 7)	Mild (n = 9)	No ED (n = 4)	p-value
Age (years) <sup>1</sup>	37 (7.4)	36 (9.4)	30 (3.3)	32 (8.1)	37 (11.7)	0.405
Onset of SCI (months) <sup>1</sup>	42 (45.9)	84 (66.9)	53 (58.9)	47 (48.5)	135 (35.8)	0.077
Level of paralysis <sup>2</sup>						0.850
Complete paraplegia	3 (75)	5 (71)	5 (71)	5 (56)	3 (75)	
Incomplete paraplegia	-	1 (14)	1 (14)	2 (22)	-	
Complete tetraplegia	-	-	1 (24)	-	-	
Incomplete tetraplegia	1 (25)	1 (14)	-	2 (22)	1 (25)	
Relationship status <sup>2</sup>						0.471
No partner	-	-	1 (14)	-	-	
Partner	4 (100)	7 (100)	6 (86)	9 (100)	4 (100)	
Parenting children <sup>2</sup>	2 (50)	4 (57)	3 (57)	1 (11)	1 (25)	0.343
Smoking <sup>2</sup>	-	2 (29)	5 (71)	2 (22)	1 (25)	0.117
PDE5 inhibitor usage <sup>2</sup>	1 (25)	3 (43)	3 (43)	3 (33)	3 (75)	0.637
Ejaculation <sup>2</sup>	-	2 (29)	-	2 (22)	2 (50)	0.242
Fertility treatment requirement <sup>2</sup>	2 (50)	4 (57)	5 (71)	6 (67)	2 (50)	0.925
Average sexual intercourse per month	1-2	5-6	3-4	5-6	5-6	

<sup>1</sup>Mean (SD), <sup>2</sup>number (%)

IIEF, International Index of Erectile Function; SCI, spinal cord injury; ED, erectile dysfunction; PDE5, phosphodiesterase type 5



**Figure 1.** Percentage of regular and no sexual intercourse in 51 patients with self-managed bladder (PDE5, phosphodiesterase type 5) IIEF, International Index of Erectile Function

The characteristics of erectile dysfunction in 18 SCI patients with regular sexual intercourse and no PDE5 inhibitor usage was presented in in Table 4. There were also no statistically significant differences in terms of all clinical data among groups of ED severity.

Based on their IIEF-5 scores, 18 patients with regular sexual intercourse and no PDE5 inhibitor usage were classified into 5 different severity levels. Among these patients, mild erectile dysfunction (33%) was found most, followed by mild to moderate (22%), moderate (22%), severe (17%) and no ED (5%) as shown in Figure 2. The prevalence of erectile dysfunction in this study was 94% (17 out of 18 patients) and 61% of patients (31 out of 51 patients) with self-controlled bladder were sexually-active or having regular sexual intercourse.

## Discussion

This retrospective study was aimed to identify severity of ED in Thai male SCI patients with regular sexual activity and analyze their relevant clinical data and IIEF-5 score. According to the results, mild ED was found most in overall patients, followed by mild to moderate, moderate, severe and no ED.

The findings indicated that mild ED was common among Thai male SCI patients who had active sexual activity. It was also found that those having regular sexual intercourse had partner and tended to use PDE inhibitor more than those with no sexual activity. In addition, in terms of level of paralysis, no statistical difference was found between regular and no sexual activity patients. In contrast to our findings, Akman et al. reported that 87.3% of SCI patients had moderate to severe ED with the mean IIEF-5 score of 5.3 (SD 4.1). This may suggest that when patients who did not have sexual activity (38%) were included, the results might not reflect accurate erectile function scores.<sup>21</sup>

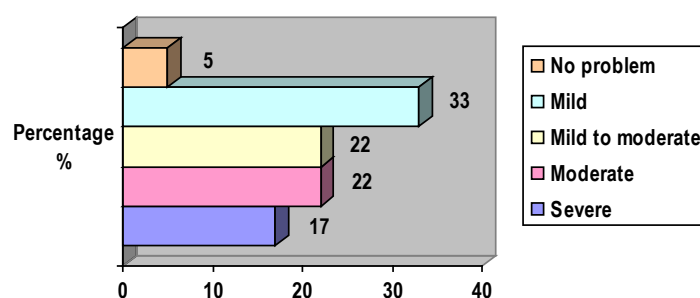
Regarding the prevalence of ED in this study (94%, as shown in Table 5), the prevalence of ED was slightly increased when compared with previous 2 studies in Thailand.<sup>16,17</sup> The explanation for this might be that Erection Hardness Score (EHS) could only be used to assess erectile hardness for penetration, not the completion of intercourse.<sup>22</sup> Consequently, the entire erectile function could not be evaluated. The result reported by the latest study in 2015 using the 6-item erectile function (EF) domain of the IIEF-15 was also slightly different.<sup>17</sup> IIEF-EF was used for assessing ED in

**Table 4.** Characteristics of erectile dysfunction in 18 SCI patients with regular sexual intercourse and no PDE5 inhibitor usage

Severity of ED	Severe (n = 3)	Moderate (n = 4)	Mild to moderate (n = 4)	Mild (n = 6)	No ED (n = 11)	p-value
Age (years) <sup>1</sup>	35 (6.8)	38 (12.7)	30 (4.4)	33 (7.8)	26	0.622
Duration of SCI (months)	19 (14.6)	75 (70.3)	24 (16.4)	45 (57.7)	187	0.080
Level of paralysis <sup>2</sup>						0.327
Complete paraplegia	2 (67)	4 (100)	2 (50)	2 (33)	-	
Incomplete paraplegia	-	-	1 (25)	2 (33)	-	
Complete tetraplegia	-	-	1 (25)	-	-	
Incomplete tetraplegia	1 (33)	-	-	2 (33)	1 (100)	
Relationship status						0.447
No partner	-	-	1 (25)	-	-	
Partner	3 (100)	4 (100)	3 (75)	6 (100)	1 (100)	
Parenting children	1 (33)	3 (75)	1 (25)	1 (17)	-	0.343
Smoking	-	2 (50)	3 (75)	-	1 (100)	0.129
Ejaculation	-	-	-	2 (33)	1 (100)	0.078
Fertility treatment requirement	1 (33)	2 (50)	3 (75)	5 (83)	1 (100)	0.497
Average sexual intercourse per month	1-2	5-6	1-2	3-4	5-6	

<sup>1</sup>Mean (SD), <sup>2</sup>number (%)

SCI, spinal cord injury; ED, erectile dysfunction



**Figure 2.** Severity groups found in 18 SCI patients with regular sexual intercourse and no PDE5 inhibitor usage, based on their IIEF-5 scores IIEF-5, International Index of Erectile Function-5



**Table 5.** Comparison with other studies in Thailand

Author	Year	N of sexually-active patients	Tool	ED prevalence
Moonla et al. <sup>16</sup>	2010	15	Erection Hardness Score	71.4%
Sudsaneha et al. <sup>17</sup>	2015	25	IIEF-EF*	84%
This study	2020	18	IIEF-5	94%

ED, erectile dysfunction; IIEF-EF, International Index of Erectile Function – Erectile Function

the past 4 weeks and some questions on erection during caressing, foreplay and masturbation were added.<sup>23</sup> Thus, the score from patients who did not attempt sexual intercourse in 4-week period might lower than others.

As mild severity was mostly common (29%) in this study, followed by mild to moderate (22%), moderate (22%), severe (17%) and no ED (5%). These findings slightly differ from Sudsaneha et al.<sup>17</sup> reporting that mild to moderate was found most (32%), followed by severe (28%) and no ED (16%). The differences might be caused by the different tools used for evaluation. The average sexual intercourse in this study which was only 1-2 times per month in the severe group also suggests that an ED-evaluation tool for SCI patients should be designed to assess patients for longer than 4 weeks.

It was also found that patients who received oral drug as erectile dysfunction treatment had more sexual activity (42% in patients with regular sexual intercourse and 75% in patients with no ED). This is similar to the results of a randomized trial conducted by Giuliano et al. who found that sildenafil could improve sexual function in 80% of SCI patients while placebo could improve it in only 10% of the patients.<sup>24</sup> This finding is also in line with Soler et al. who reported that no ED was found in 85% of chronic SCI patients who received oral PDE5 inhibitors or intracavernosal injections of prostaglandin.<sup>25</sup> Moreover, the quality of life improvement after an erectile problem treatment was also denoted.<sup>26</sup>

The findings of this research suggest that sexual education is essential for all SCI patients and their partners as preserved sexual function can maintain their intimacy and relationship. Results from a study in Turkey indicated that only 8.5% of SCI patients were informed about sexuality and fertility after their trauma, and most of them preferred to be trained at the end of their rehabilitation program (74.5%) and by physicians (78.7%).<sup>21</sup> Similarly, a study in Thailand<sup>16</sup> found that only 26.8% of SCI patients reporting having sex education and 80% of them did self-learning from handbooks. Moreover, oral PDE5 inhibitors should be considered in erectile dysfunction patients with close monitoring of some side effects.

Some limitations of this study should be considered. First, as the subjects of this study was only patients in a rehabilitation institute, and the sample size was small, the results may not be generalizable to the larger population especially those in the other regions of Thailand who were unable to approach the rehabilitation program. Second, the influence

of other factors such as alcohol use, depression or relationship problems were not being examined in this study. They may affect ED in some ways. Therefore, further research with a larger sample size should include SCI patients from other regions of Thailand, include some other medical issues and relevant factors, and focus more on the outcomes after sexual counseling or medical administration.

In summary, it was found in this study that mild erectile dysfunction was found most in Thai male SCI patients with regular sexual activity and no drug treatment for ED. Moreover, preserving their intimate relationship and the use of PDE5 inhibitors might help impel their sexual activity.

## Disclosure

The researchers have no conflict of interest to declare.

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