



## Review paper

# Use of the International Index of Erectile Function to assess sexual dysfunction in the male population with prostate cancer treated by radical prostatectomy – a systematic review

**Tomasz Jürys<sup>1</sup>**, **Bartłomiej Burzyński<sup>2</sup>**, **Andrzej Paradysz<sup>3</sup>**, **Piotr Bryniarski<sup>3</sup>**

<sup>1</sup> Doctoral School, Faculty of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland

<sup>2</sup> Department of Rehabilitation, Faculty of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland

<sup>3</sup> Department of Urology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice, Poland

## ARTICLE INFO

### Article history

Received 7 April 2021

Accepted 5 May 2021

Available online 24 August 2021

### Keywords

Prostate cancer

Erectile dysfunction

Prostatectomy

### Doi

<https://doi.org/10.29089/2020.20.00173>

### User license

This work is licensed under a Creative Commons Attribution – NonCommercial – NoDerivatives 4.0 International License.



## ABSTRACT

**Introduction:** Prostate carcinoma is the second most commonly diagnosed cancer among men, accounting for 14.1% of diagnoses and with a 6.8% mortality rate. Among current treatment options, radical prostatectomy is strongly indicated for localized prostate cancer. Although surgical techniques for radical prostatectomy are constantly being improved in terms of effectiveness and safety, postoperative disorders such as stress urinary incontinence and sexual dysfunction, including erectile dysfunction, remain quite common.

**Aim:** The aim of our systematic review is to discuss the prevalence and severity of sexual dysfunction in the population of men suffering from prostate cancer who have been treated by means of radical prostatectomy.

**Material and methods:** For the purposes of this systematic review we undertook a search of the literature in five databases using the English and Polish languages. We have focused on studies which assess sexual dysfunction using the International Index of Erectile Function (IIEF) questionnaire.

**Results and discussion:** A total of 145 potentially relevant studies was retrieved. After selection, it was determined that 5 studies fulfilled the eligibility criteria and these were selected for qualitative synthesis. Our systematic review supports the finding that impairment of sexual function continues during the first 12 months after radical prostatectomy.

**Conclusions:** Sexual dysfunction is a common complication after radical prostatectomy, and recovery takes at least 12 months. The male population with prostate cancer is at risk of sexual dysfunction even before radical prostatectomy due to age, comorbidities and mental factors related to the course of the disease.

## 1. INTRODUCTION

Prostate cancer is the second most frequently diagnosed cancer among men,<sup>1</sup> accounting for 14.1% of diagnoses.<sup>2</sup> Currently, the prostate cancer mortality rate is nearly 6.8%.<sup>2</sup> Prostate cancer treatment options include surgical, radiological and hormonal methods. Radical prostatectomy is a surgical method recommended for men with clinically localized prostate cancer.<sup>3,4</sup> Surgical techniques for radical prostatectomy are constantly being developed with a view to making improvements in both effectiveness and safety. Mortality from postsurgical complications of radical prostatectomy remain at a constant low level of 0%–1.5%. Complications of the circulatory system remain at an equally low level.<sup>3,5</sup> Despite this, there are two very important and quite common postoperative disorders, namely stress urinary incontinence and sexual dysfunction, the latter including erectile dysfunction, which occurs with a frequency of 14%–90%.<sup>3,5–7</sup>

## 2. AIM

The aim of our systematic review is to discuss the prevalence and severity of sexual dysfunction in the population of men who suffer from prostate cancer and have undergone radical prostatectomy. We have focused on studies which assess sexual dysfunction using the IIEF-15 questionnaire.

## 3. MATERIAL AND METHODS

In order to perform a systematic review with high methodological standards, we have used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.<sup>8</sup>

### 3.1. Search strategy

For the purposes of this systematic review we searched the literature in five databases: PubMed/MEDLINE, EMBASE, Web of Science, Scopus, Polish Medical Library. We searched for articles in the English and Polish languages which were published during the last 10 years. The terms

sexual dysfunction, sexual disorder, erectile dysfunction or erectile disorder, International Index of Erectile Function or IIEF, prostate cancer or prostate carcinoma, and radical prostatectomy were used, the precise search strategy being adjusted for each database and language. An example search strategy, for the PubMed/MEDLINE database, is given in Table 1. We also reviewed reference lists from selected articles, reviewed papers cited in relevant studies on the topic, identified key journals on the topic, and manually searched tables of contents.

### 3.2. Inclusion and exclusion criteria

Records were screened using the following inclusion criteria:

- (1) population of men with prostate cancer treated by means of radical prostatectomy;
- (2) no other treatment before radical prostatectomy;
- (3) assessment of sexual dysfunction using IIEF-15 questionnaire;
- (4) assessment of sexual dysfunction before and at least once after radical prostatectomy.

Papers were excluded based on the following criteria:

- (1) no assessment of quality of life before or after surgery;
- (2) no use of IIEF-15 questionnaire;
- (3) radical prostatectomy not a form of treatment.

Any disagreements between authors concerning inclusion or exclusion of particular records in the analysis were reconciled via discussion until a consensus was reached.

### 3.3. IIEF-15 questionnaire

The International Index of Erectile Function – 15 items is a tool for the self-assessment of sexual function. The questionnaire was created in 1997 by Raymond C Rosen et al. It comprises 15 questions that relate to the most recent four weeks of life and allows for self-assessment in five domains: erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. In the IIEF-15 questionnaire, the answers to the questions are converted into points on a scale from 0 to 5 (questions 1–10) or from 1 to 5 (questions 11–15). A higher score on a functional scale indicates a lower severity of sexual disorder. In addition, within the domain of erectile function, the severity of disorder is divided depending on the number of points obtained and classified into the following five categories: severe erec-

**Table 1. Example search strategy.**

Database	Terms
PubMed/MEDLINE	(1) Sexual dysfunction (2) Sexual disorder (3) Erectile dysfunction (4) Erectile disorder (5) (1) OR (2) OR (3) OR (4) (6) International Index of Erectile Function (7) IIEF (8) (6) OR (7) (8) Prostate cancer (9) Prostate carcinoma (10) (8) OR (9) (11) Radical prostatectomy (12) (5) AND (8) AND (10) AND (11)

tile dysfunction (6–10 points), moderate erectile dysfunction (11–16 points), mild to moderate erectile dysfunction (17–21 points), mild erectile dysfunction (22–25 points), no erectile dysfunction (26–30 points).<sup>9,10</sup>

## 4. RESULTS

### 4.1. Study selection

A total of 145 potentially relevant studies was retrieved. After selection, it was determined that 5 studies fulfilled the eligibility criteria and these were selected for qualitative synthesis. A PRISMA flow chart diagram of the selection process is presented in Figure 1.

### 4.2. Description of studies

Of the five studies included in this review, four were from Europe and were conducted in three different countries; the other was from Australia. One of the studies had a randomized controlled trial design, while the other four had an observational design. The studies covered a total of 1223 patients. The most frequent follow-up time for assessment of sexual dysfunction after surgery was 1 year after radical prostatectomy. Only two studies evaluated the cohort more than once after surgery. The mean age of patients in all of the studies was about 60 years. Characteristics and summaries of the studies included in the qualitative synthesis are presented in Table 2.

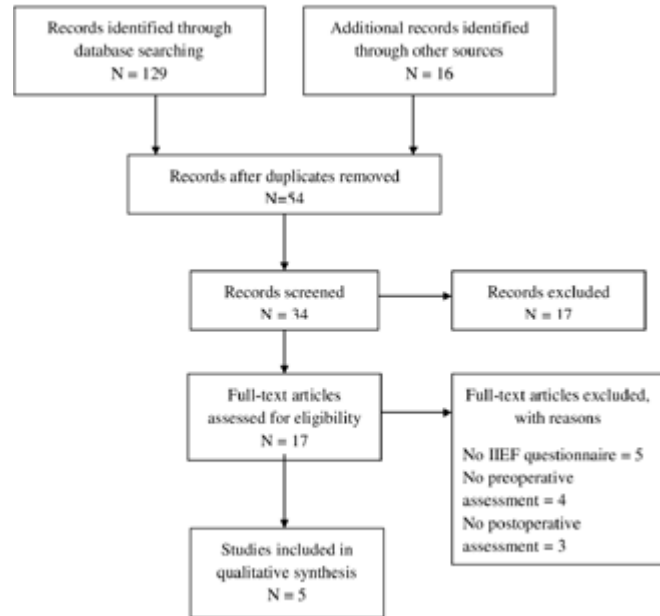
### 4.3. Quality of included studies

Quality assessment of the included studies was conducted using the Critical Appraisal Skills Programme (CASP). The tools for assessing observational studies (both cohort and case control studies) and randomised controlled trials were used. The studies were evaluated according to the CASP checklists and classified as having high quality when 100% of criteria were met and as having risk of low quality when 25% of criteria were met. A significant methodological weakness of the studies included in our qualitative synthesis lies in the lack of identification of confounding factors, hence, no taking account of such factors in study design and results analysis. The quality of studies assessment is presented in Table 2.

## 5. DISCUSSION

Our systematic review of the literature assesses the prevalence and severity of sexual dysfunction (including erectile dysfunction) in the male population suffering from prostate cancer and treated by radical prostatectomy. We focus on studies that use the IIEF-15 questionnaire, which has a high degree of internal consistency.

Among the most common postoperative complications are sexual disorders, including erectile dysfunction. However, the results of our review indicate that sexual dysfunctions were also observed in a significant part of the studied



**Figure 1. PRISMA flow chart.**

group before surgery. The severity of sexual dysfunction symptoms before surgery was mostly assessed as moderate or mild to moderate. The prevalence and severity of sexual dysfunction before surgery may be attributed to certain risk factors. The main and confirmed risk factors of sexual dysfunction are as follows: age of over 60 years, comorbidities (i.e. hypertension, cardiovascular disease, obesity), psychosocial factors (i.e. emotional problems, stress, anxiety).<sup>16,17</sup>

Examination of the results on the IIEF-15 scale for patients after surgery clearly indicates that there is a significant reduction in sexual function, including an increase in both the frequency and the severity of erectile dysfunction. This phenomenon is observed at both 3-month and the 12-month postoperative evaluations. These observations find support in other studies which show that the average time required for recovery of sexual potency after prostate cancer surgery is between 12 and 24 months.<sup>7,18</sup> In our systematic review, however, we could not completely support the fact of recovery 1 year after radical prostatectomy, due to a lack of adequate follow-up in the included studies. Only in the Koehler et al. study is a small but significant improvement observed from 6 to 12 months.<sup>11</sup>

A number of limitations in this systematic review should be acknowledged. First, the literature search was restricted to articles published in English and Polish. Therefore, articles in Asian, Spanish or French languages are not included. Second, a significant number of the qualifying articles did not give full information about the clinical and/or pathological stage of the tumor, surgical techniques, the follow-up assessment period, or raw results on the full IIEF 15-item scale. Such data would form a basis for a comparison of the studied groups, and their absence means that there is no possibility of attempting a meta-analysis.

Table 2. Summary of included studies.

No.	First author, year	Quality of study <sup>a</sup>	Sample size	Age	Characteristics of population			Surgical technique	Timing of IIEF assessment	Main results
					Clinical stage of tumor	Pathological stage of tumor				
1	Koehler, 2012 <sup>11</sup>	***	329	65.3 (6.4)	NI	pT1a-pT3b	RRP, EERP	Before RP; 3, 6, 12 months after RP	Before surgery, the median IIEF-EF scores were 24.6 and 23.9 in the nerve-sparing and non nerve-sparing group respectively. After 3 months, the patients' IIEF-EF scores had significantly decreased: 80% of patients had a severe form of ED. From 3 to 6 months, no significant improvements were measured. From 6 to 12 months, a small but significant improvement was seen. In other subdomains, before RP; mild or moderate forms of sexual disorder were observed. The follow-up results indicate a considerable reduction in the median scores for each subdomain at 3 months post-surgery. Significant improvements from 3 to 12 months were not observed.	
2	Acar, 2014 <sup>12</sup>	***	65	59.5 (6.1)	cT1-cT2	NI	RALP	Before RP; min. 1 year after RP	Before surgery, the total IIEF median (SD) score was 55.15 (19.0). The median (SD) IIEF-EF score was 24.32 (8.60), indicating mild ED. In other subdomains, the baseline scores demonstrated mild forms of sexual function disorders. Follow-up results showed a significant decline in total and subdomain IIEF median scores, except in the sexual desire domain, in which the decline was not significant. The total IIEF median (SD) score was 41.11 (22.5). The median scores for IIEF-EF indicated moderate ED. In other subdomains, results showed mild to moderate disorder.	
3	van der Bergh, 2015 <sup>13</sup>	***	392 <sup>b</sup>	62.3 <sup>c</sup> (6.8) 60.7 <sup>d</sup> (6.0)	cT1c-cT2c	pT0-pT4b	RARP	Before RP; on average 6 months	The following results refer only to total IIEF scores with no subdomain division. Before RP, the total IIEF score was significantly higher in the group of patients who had undergone RARP after Active Surveillance (53.6) than in the group which had undergone direct RARP (45.1). After RARP, a significant deterioration in the total IIEF score was observed in both groups. The RARP after Active Surveillance group presented significantly higher scores (37.0) than the group with no Active Surveillance (27.6).	
4	Geiger-Gritsch, 2015 <sup>14</sup>	***	111 <sup>e</sup>	59.7f (NI)	cT2a-cT4	NI	NI	Before RP; 12 months after RP	The following results refer only to the IIEF-EF subdomain. Before surgery, 60.7% of patients reported no ED, 25.2% had mild to moderate ED, and 14.4% had severe ED. After RP, patients' erectile function declined significantly. Only 19.8% of patient had no ED, 35.1% had mild to moderate ED, and 45.0% had severe ED. In the non nerve-sparing RP group, the severe form of ED was significantly more frequent (87.0%) in comparison with the nerve-sparing RP group (34.1%).	
5	Yaxley, 2016 <sup>15</sup>	**	326	60.01 (6.24)	≥cT2b	NI	RALP, RRP	Before RP; 6, 12 weeks after RP	The following results refer only to total IIEF scores with no subdomain division. Before surgery, the median IIEF total score was 43.96 in the RRP group and 46.65 in the RALP group, but the difference was not significant. 6 weeks after RP, a sharp decline in IIEF total scores was observed. The median scores were 23.75 in the RRP group and 25.63 in the RALP group. After 12 weeks, significant improvements were not observed in either group.	

Comments: ED – erectile dysfunction, EERP – endoscopic extraperitoneal radical prostatectomy, IIEF – international index of erectile function, IIEF-EF – IIEF – erectile function domain NI – No Information, RALP – robot-assisted laparoscopic prostatectomy, RARP – robot-assisted radical prostatectomy, RP – radical prostatectomy, RRP – radical retropubic prostatectomy; <sup>a</sup> critical assessment of study quality was conducted using different design-specific CASP checklists (\* 25% of criteria met, \*\* 50% of criteria met, \*\*\* 75% of criteria met, \*\*\*\* 100% of criteria met); <sup>b</sup> This number represents a group of patients who underwent direct RARP and RARP after Active Surveillance; <sup>c</sup> This number represents a group of patients who underwent RARP; <sup>d</sup> This number represents a group of patients who underwent direct RARP; <sup>e</sup> This number represents a group of patients who were assessed using the IIEF questionnaire; <sup>f</sup> This information relates to a group of patients who were assessed using the IIEF questionnaire.

## 6. CONCLUSIONS

- (1) Sexual disorders, including erectile dysfunction, are common complications after radical prostatectomy and may have an important impact on the quality of life of patients suffering from prostate cancer.
- (2) Male population with prostate cancer is at risk of sexual dysfunction even before radical prostatectomy due to age, comorbidities and mental factors related to the course of the disease.
- (3) The process of recovery of sexual function is lengthy, complex, and individual, and takes at least 12 months.
- (4) Assessment of sexual function should therefore be performed regularly as one of the tools for evaluating the effectiveness of prostate cancer treatment.

### Conflict of interest

None declared.

### Funding

None declared.

### References

- 1 Wojciechowska U, Hurwitz LM, Helicki G, et al. Decade-long trends in prostate cancer incidence and mortality in Poland, 1999–2012. *Pol Ann Med.* 2018;25(1):56–61. <https://doi.org/10.29089/2017.17.00017>.
- 2 Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2021; 71(3):209–249. <https://doi.org/10.3322/caac.21660>.
- 3 EAU, EANM, ESTRO, ESUR, ISUP, SIOG. Guidelines on Prostate Cancer. <http://uroweb.org/guidelines/compilations-of-all-guidelines/>. Published 2018. Updated 2021. Accessed March 26, 2021.
- 4 Albertsen PC. Observational studies and the natural history of screen-detected prostate cancer. *Curr Opin Urol.* 2015;25(3):232–237. <https://doi.org/10.1097/mou.000000000000157>.
- 5 Wallis CJ, Herschorn S, Saskin R, et al. Complications after radical prostatectomy or radiotherapy for prostate cancer: results of a population-based, propensity score-matched analysis. *Urology.* 2015;85(3):621–627. <https://doi.org/10.1016/j.urology.2014.11.037>.
- 6 Park DL, Aron M, Rewcastle JC, Boyd SD, Gill IS. A model for managing erectile dysfunction following prostate cancer treatment. *Curr Opin Urol.* 2013;23(2):129–134. <https://doi.org/10.1097/mou.0b013e32835d4d41>.
- 7 Saleh A, Abboudi H, Ghazal-Aswad M, Mayer EK, Vale JA. Management of erectile dysfunction post-radical prostatectomy. *Res Rep Urol.* 2015;7:19–33. <https://dx.doi.org/10.2147%2FRRU.S58974>.
- 8 Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med.* 2009;6(7):e1000097. <https://doi.org/10.1371/journal.pmed.1000097>.
- 9 Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. *Urology.* 1997;49(6):822–830. [https://doi.org/10.1016/s0090-4295\(97\)00238-0](https://doi.org/10.1016/s0090-4295(97)00238-0).
- 10 Cappelleri JC, Rosen RC, Smith MD, Mishra A, Osterloh IH. Diagnostic evaluation of the erectile function domain of the International Index of Erectile Function. *Urology.* 1999;54(2):346–351. [https://doi.org/10.1016/s0090-4295\(99\)00099-0](https://doi.org/10.1016/s0090-4295(99)00099-0).
- 11 Koehler N, Holze S, Gansera L, et al. Erectile dysfunction after radical prostatectomy: the impact of nerve-sparing status and surgical approach. *Int J Impot Res.* 2012;24(4):155–160. <https://doi.org/10.1038/ijir.2012.8>.
- 12 Acar C, Schoffemeer CC, Tillier C, de Blok W, van Muilekom E, van der Poel HG. Quality of life in patients with low-risk prostate cancer. A comparative retrospective study: brachytherapy versus robot-assisted laparoscopic prostatectomy versus active surveillance. *J Endourol.* 2014;28(1):117–124. <https://doi.org/10.1089/end.2013.0349>.
- 13 van den Bergh RC, de Blok W, van Muilekom E, Tillier C, Venderbos LD, van der Poel HG. Impact on quality of life of radical prostatectomy after initial active surveillance: more to lose?. *Scand J Urol.* 2014;48(4):367–373. <https://doi.org/10.3109/21681805.2013.876097>.
- 14 Geiger-Gritsch S, Oberaigner W, Mühlberger N, et al. Patient-reported urinary incontinence and erectile dysfunction following radical prostatectomy: results from the European Prostate Centre Innsbruck. *Urol Int.* 2015;94(4):419–427. <https://doi.org/10.1159/000369475>.
- 15 Yaxley JW, Coughlin GD, Chambers SK, et al. Robot-assisted laparoscopic prostatectomy versus open radical retropubic prostatectomy: early outcomes from a randomised controlled phase 3 study. *Lancet.* 2016;388(10049):1057–1066. [https://doi.org/10.1016/S0140-6736\(16\)30592-X](https://doi.org/10.1016/S0140-6736(16)30592-X).
- 16 DeLay KJ, Haney N, Hellstrom WJ. Modifying risk factors in the management of erectile dysfunction: A review. *World J Mens Health.* 2016;34(2):89–100. <https://dx.doi.org/10.5534%2Fwjmh.2016.34.2.89>.
- 17 Grover S, Shouan A. Assessment scales for sexual disorders – A review. *J Psychosex Health.* 2020;2(2):121–138. <https://doi.org/10.1177%2F2631831820919581>.
- 18 Salonia A, Burnett AL, Graefen M, et al. Prevention and management of postprostatectomy sexual dysfunctions. Part 1: choosing the right patient at the right time for the right surgery. *Eur Urol.* 2012;62(2):261–272. <https://doi.org/10.1016/j.eururo.2012.04.046>.