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The effect of perineal extracorporeal shock wave therapy applied to chronic prostatitis patients on sexual functions and prostatitis symptoms

 Emrah Yakut¹,  Bahri Gok²¹*Yüksek İhtisas University, Faculty of Medicine, Department of Urology, Ankara, Türkiye*²*Memorial Ankara Hastanesi, Department of Urology, Ankara, Türkiye*

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Abstract

It was aimed to investigate the effect of perineal extracorporeal shock wave therapy (ESWT) applied to chronic prostatitis (CP) patients on prostatitis symptoms and sexual functions, based on age and body mass index (BMI) parameters. Forty male patients aged 18 and over who underwent ESWT for CP were included in the study. The age and BMI of the patients were recorded. Patients were evaluated with the International Erectile Function Form and the International Health Institute – Chronic Prostatitis Symptom Index before and 3 months after ESWT. Prostatitis symptoms and sexual function values of the patients were analyzed, as well as age and BMI parameters. The average age of the patients was 31 (± 7.88) years and the average BMI was 25.27 (± 4.89) kg/m². When all patients were evaluated, ESWT; it created a statistically significant positive difference in pain and quality of life scores on the CP side. ESWT; created a statistically significant positive difference in erectile function and sexual and general satisfaction scores. When looking at ESWT effectiveness according to BMI values; erectile function, orgasmic function, and sexual and general satisfaction scores increased more in normal-weight patients than in obese patients. In addition, a greater decrease in prostatitis pain score was observed after treatment in normal-weight patients compared to obese patients. ESWT treatment is an effective method for CP patients, especially in relieving pain. The erectile function also increases sexual and general satisfaction. In obese people, its contribution to both pain palliation and erectile function is limited. Prospective, randomized, multicenter, and high-participation studies are needed.

Keywords: Chronic prostatitis, erectile dysfunction, extracorporeal shock wave therapy, obesity, pain

Introduction

Prostatitis is one of the most common urogenital system diseases in men [1]. It is commonly seen in middle age and affects quality of life negatively [2], and it is known that it may even lead to divorce [3]. Approximately half of men may encounter this condition at some point in their lives [4]. It is divided into four categories by the National Institute of Health (NIH): category I, acute bacterial prostatitis; category II, chronic bacterial prostatitis; category III, chronic prostatitis/chronic pelvic pain syndrome; and category IV, asymptomatic inflammatory prostatitis. Approximately 95% of patients are category III chronic prostatitis [5]. Chronic prostatitis (CP), as defined

by the National Institutes of Health (NIH), refers to persistent pelvic discomfort and tenderness, significantly compromising an individual's quality of life for a duration of at least three out of the preceding six months, following the exclusion of any infectious etiology or other underlying pathologies [5]. Pelvic pain may be accompanied by genital pain, pain during ejaculation, obstructive voiding symptoms, and erectile dysfunction (ED) [6,7].

Despite advances in diagnostic and therapeutic approaches based on the developing experience regarding the etiopathology of CP, there is no single-agent treatment with proven high efficacy against this syndrome approved by international consensus [8]. As a medical treatment, antibiotics, analgesics, anti-

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Corresponding Author: Emrah Yakut, Yüksek İhtisas University, Faculty of Medicine, Department of Urology, Çankaya Ankara, Türkiye
Email: dremrahyakut@gmail.com

inflammatories, alpha-blockers, 5-alpha reductase inhibitors, and phosphodiesterase type-5 inhibitors that can penetrate prostate tissue have been tried both alone and in combination, and some studies have found improvement in symptoms [9]. Alternatively, phytotherapy, including quercetin, cernilton, eviprost/pollen extract, and pentosan polysulfate, as well as non-pharmacologic treatments such as acupuncture and extracorporeal shock wave therapy (ESWT), has also shown efficacy in the treatment of CP [10,11].

ESWT has primarily been used to manage musculoskeletal pain [12]. In the following period, it was found to be effective in the treatment of spasticities [13], tendinopathies, soft tissue injuries [14,15], refractory angina pectoris, and ED [16]. Perineal ESWT was started to be used in the treatment of CP in 2008 and improved patients' pain symptoms and quality of life [17]. Although many studies have shown the efficacy of ESWT for CP, there is no clear treatment protocol [18,19]. In our study, we compared prostatitis symptoms and sexual functions before and three months after treatment in patients who underwent ESWT for CP. We aimed to evaluate how age and body mass index (BMI) affected post-treatment efficacy, which has not been studied much in the literature.

Material and Methods

This study included 40 male patients aged 18 years and older who were admitted to Memorial Ankara Hospital Urology Clinic in 2023 due to CP and who underwent ESWT after failure to respond to medical treatments (antibiotics, anti-inflammatories, alpha-blockers). Age and BMI were recorded. Two cup tests were performed in patients with CP symptoms. Patients with negative urine analysis before and after prostate massage were included in the study as category III - CP. Exclusion criteria were as follows: (i) the patient did not want to participate in the study, (ii) the patient had a previous history of sexual dysfunction, (iii) the patient had a known psychiatric history, (iiii) symptoms had been present for less than three months, (iiiii) proven urinary tract infection, (iiiii) prostate and pelvic surgery or radiotherapy, (iiiii) neurologic bladder, bladder stone or urethral stricture.

The patients were treated using Medispect Bold ESWT device without any anesthesia for a total of 12 sessions for six weeks, two sessions per week. In each session, 500 shock waves (3000 shock waves in total) were applied to six points in the perineum (four points of the perineal prostate projection and the right and left regions from the root of the penis). The energy setting was 3 Hz frequency, and the maximum total energy flow density was 0.25 mJ/mm². The IIEFF and NIH-CPSI were completed before and three months after treatment in patients who met the criteria.

International Erectile Function Form (IIEFF) is a form applied to men to evaluate sexual dysfunction according to the European Urological Association Guidelines. With this form, patients are asked 15 questions determining erectile function, orgasmic function, sexual desire, sexual intercourse satisfaction, and

general satisfaction, and these five different sexual function areas are scored according to the answers received [20]. The Turkish validity and reliability of this form have been determined by various researchers, and it has been found to show good psychometric properties [21,22].

The National Institute of Health - Chronic Prostatitis Symptom Index (NIH-CPSI) is a questionnaire that assesses the severity of CP symptoms and response to treatment. This index consists of nine items, including three main scoring groups: pain, voiding symptoms, and quality of life. A high score indicates the severity of symptoms [23].

SPSS version 25 (IBM SPSS, Türkiye) package program was used for data analysis. First, descriptive statistical measures (frequencies and percentages) were used in data analysis. It was determined that there were no missing values during the data collection process. Dependent and independent samples t-tests were used to determine the differences between the groups. An alpha level of 0.05 was used for statistical significance.

Before reaching the study group of the research, a power analysis was performed and the minimum sample size was calculated as 13 for each group, a total of 26 people. Power analysis was conducted through the Gpower (version 3.1.9.7) package program (for power analysis, $\alpha=.05$; effect size=.80; $1-\beta=.80$; two-way hypothesis; $n1/n2=1$).

The ethics committee approval of the study was granted by Ömer Halisdemir University Non-Interventional Clinical Research Ethics Committee (no: 2023/100). The study was conducted following the Declaration of Helsinki and each participant was informed about the research at the beginning of the application, signed an informed consent form, and then included in the study.

Results

In the descriptive statistics of the sociodemographic information of the patients, the mean age was 31 (± 7.88) years. The mean BMI was 25.27 (± 4.89) kg/m².

Pain scores for CP, voiding symptoms, quality of life and erectile function, orgasmic function, sexual desire, sexual satisfaction, and general satisfaction values for sexual functions were compared before and three months after ESWT treatment.

Table 1 revealed that erectile function, sexual satisfaction, and general satisfaction of the patients differed after ESWT treatment compared to before treatment, and this difference was statistically significant ($p<.05$). When the mean scores were analyzed, it was found that erectile function, sexual and general satisfaction increased. The effect size was calculated for the practical significance of the significant difference, and it was determined that this difference had a significant effect on practice. On the other hand, it was determined that there was no statistically significant difference in orgasmic function and sexual desire scores. In other words, it was determined that ESWT treatment was not effective in terms of orgasmic function and sexual desire.

Table 1. Results of the dependent samples t-test for comparing the prostatitis symptoms and sexual functions of the patients with the initial values

Variables	Measurement	N	$\bar{x}$	SD	sd	t	p	d
Erectile function	1.measurement	40	21.55	3.06	39	5.59	.000	0.89
	2.measurement	40	23.15	3.93				
Orgasmic function	1.measurement	40	7.10	0.98	39	0.44	.660	--
	2.measurement	40	7.13	0.97				
Sexual desire	1.measurement	40	7.10	0.96	39	0.00	1.000	--
	2.measurement	40	7.10	0.98				
Sexual satisfaction	1.measurement	40	10.70	1.49	39	5.28	.000	0.84
	2.measurement	40	11.80	2.17				
General satisfaction	1.measurement	40	6.83	0.93	39	6.66	.000	1.05
	2.measurement	40	7.85	1.41				
Pain score	1.measurement	40	13.60	2.99	39	-6.46	.000	1.02
	2.measurement	40	9.68	3.93				
Voiding symptoms	1.measurement	40	4.43	1.93	39	-1.88	.067	--
	2.measurement	40	4.18	1.93				
Quality of life	1.measurement	40	6.98	2.03	39	-7.15	.000	1.13
	2.measurement	40	5.00	2.62				

When the prostatitis symptoms of the patients were analyzed, it was found that pain and quality of life scores were statistically different after ESWT treatment ($p<.05$). Upon analysis of the mean scores, it was observed that both the pain scores and the quality of life scores exhibited a decrease when compared to the baseline measurements of the patients. Effect sizes were calculated for practical significance, and it was determined that this difference had a significant effect on practice. As a result, ESWT was found to contribute positively to the pain and quality of life of patients. Although ESWT treatment partially decreased

voiding symptom scores, it was determined that it did not have a statistically significant effect.

After comparing the scores of the patients before and after ESWT treatment, the differences in treatment efficacy according to age and BMI values were examined. Firstly, the median value of the age variable of the patients was calculated and found to be 29.50 (18.00-47.00), and the patients were divided into two groups: 29.50 and below (group 1=young) and 29.50 and above (group 2=adult) and independent samples t-test was performed. The findings are presented in Table 2.

Table 2. Results of independent samples t-test for comparison of patients sexual functions according to age level

Variables	Measurement	Group	N	$\bar{x}$	SD	sd	t	p	d
Erectile function	1. measurement	Young	20	23.35	2.13	38	4.57	.000	1.45
		Adult	20	19.75	2.81				
	2. measurement	Young	20	25.55	3.30	38	4.85	.000	1.53
		Adult	20	20.75	2.95				
Orgasmic function	1. measurement	Young	20	7.55	0.76	38	3.23	.003	1.02
		Adult	20	6.65	0.99				
	2. measurement	Young	20	7.60	0.82	38	3.54	.001	1.12
		Adult	20	6.65	0.88				
Sexual desire	1. measurement	Young	20	7.55	0.83	38	3.35	.002	1.06
		Adult	20	6.65	0.88				
	2. measurement	Young	20	7.60	0.82	38	3.71	.001	1.17
		Adult	20	6.60	0.88				
Sexual satisfaction	1. measurement	Young	20	11.50	1.15	38	4.00	.000	1.27
		Adult	20	9.90	1.37				
	2. measurement	Young	20	12.95	1.64	38	3.91	.000	1.24
		Adult	20	10.65	2.06				
General satisfaction	1. measurement	Young	20	7.20	0.89	38	2.76	.009	0.87
		Adult	20	6.45	0.83				
	2. measurement	Young	20	8.40	1.05	38	2.66	.011	0.84
		Adult	20	7.30	1.53				

When Table 2 is examined, it is seen that there is a statistically significant difference in the sexual function of the patients according to age level both before and after ESWT treatment ($p<.05$). In order to determine the effect of ESWT treatment, the effect size was calculated for significant differences. Accordingly, when both measurements were compared for erectile function, the effect size was found to be larger after ESWT, and it was determined that ESWT treatment increased the erectile function of young patients more. Similar results were found for orgasmic function and sexual desire. However, when the effect sizes for

sexual and general satisfaction are analyzed, it is seen that the pre-treatment values are higher. Upon examining the averages, it was determined that ESWT treatment resulted in increased scores among adult patients, particularly in terms of sexual and general satisfaction.

Examining Table 3, it is observed that the prostatitis symptoms of the patients did not have a statistically significant difference according to the age level both before and after the treatment. In other words, it was determined that the age level of the patients did not affect prostatitis symptoms.

Table 3. Results of independent samples t-test for comparison of prostatitis symptoms of patients according to age level

Variables	Measurement	Group	N	$\bar{x}$	SD	sd	t	p	d
Pain score	1. measurement	Young	20	13.95	2.72	38	0.74	.466	--
		Adult	20	13.25	3.26				
	2. measurement	Young	20	9.95	4.25	38	0.44	.664	--
		Adult	20	9.40	3.68				
Voiding symptoms	1. measurement	Young	20	4.25	1.97	38	0.57	.574	--
		Adult	20	4.60	1.93				
	2. measurement	Young	20	4.00	2.00	38	0.57	.574	--
		Adult	20	4.35	1.90				
Quality of life	1. measurement	Young	20	6.85	1.60	38	0.39	.702	--
		Adult	20	7.10	2.43				
	2. measurement	Young	20	4.95	2.11	38	0.12	.906	--
		Adult	20	5.05	3.10				

After comparing the scores of the patients before and after ESWT treatment according to age level, the differences based on BMI values were analyzed. For BMI, 30 was taken as the critical value

and divided into two groups below 30 (normal) and above 30 (obese), and an independent samples t-test was performed. The findings obtained are given in Table 4.

Table 4. Results of independent samples t-test for comparison of patients' sexual functions according to their BMI level

Variables	Measurement	Group	N	$\bar{x}$	SD	sd	t	p	d
Erectile function	1. measurement	Normal	28	22.29	2.77	38	2.47	.018	0.85
		Obese	12	19.83	3.13				
	2. measurement	Normal	28	24.54	3.53	38	4.01	.000	1.38
		Obese	12	19.92	2.81				
Orgasmic function	1. measurement	Normal	28	7.32	0.86	38	2.30	.027	0.79
		Obese	12	6.58	1.08				
	2. measurement	Normal	28	7.36	0.83	38	2.47	.018	0.85
		Obese	12	6.58	1.08				
Sexual desire	1. measurement	Normal	28	7.32	0.86	38	2.37	.023	0.82
		Obese	12	6.58	1.00				
	2. measurement	Normal	28	7.29	0.90	38	1.89	.067	0.65
		Obese	12	6.67	1.07				
Sexual satisfaction	1. measurement	Normal	28	11.07	1.25	38	2.58	.014	0.89
		Obese	12	9.83	1.70				
	2. measurement	Normal	28	12.50	2.03	38	3.54	.001	1.22
		Obese	12	10.17	1.59				
General satisfaction	1. measurement	Normal	28	6.93	0.90	38	1.07	.288	0.37
		Obese	12	6.58	1.00				
	2. measurement	Normal	28	8.29	1.33	38	3.37	.002	1.16
		Obese	12	6.83	1.03				

Looking at Table 4, it is seen that there is a statistically significant difference in the sexual function of the patients according to BMI level both before and after ESWT treatment ($p<.05$). In order to determine the effect of ESWT treatment, the effect size was calculated for significant differences. Accordingly, when both measurements for erectile function were compared, it was observed that the effect size was higher after ESWT, and it was determined that ESWT treatment increased the erectile function of normal-weight patients more. When both measurements were compared for orgasmic function, it was observed that the effect size was larger after ESWT, and ESWT treatment increased the orgasmic function of normal-weight patients more. When both measurements were compared for sexual desire, it was found that the effect size decreased after ESWT and was statistically insignificant. Comparing both measures for sexual and general satisfaction according to BMI values, it was found that the scores

of normal-weight individuals increased more than those of obese individuals after treatment.

Table 5 shows that while only voiding symptoms were statistically different before ESWT treatment, all three were statistically different after treatment according to the BMI level of the patients' prostatitis symptoms. For the pain score, while both groups were at a similar level according to BMI values before treatment, there was a statistical difference after treatment, and when the mean values were analyzed, pain scores decreased significantly in normal-weight individuals, while this change was more limited in obese individuals. Upon analyzing the pre-treatment and post-treatment scores of both groups concerning voiding symptoms, it was determined that the scores of both groups regarding voiding symptoms decreased. Finally, when the quality of life was analyzed, it was found that the quality of life scores of normal individuals decreased more after treatment.

Table 5. Results of independent samples t-test for comparison of patients' prostatitis symptoms according to BMI level

Variables	Measurement	Group	N	$\bar{x}$	SD	sd	t	p	d
Pain score	1. measurement	Normal	28	13.82	3.10	38	0.71	.481	0.25
		Obese	12	13.08	2.75				
	2. measurement	Normal	28	8.36	3.39	38	3.74	.001	1.29
		Obese	12	12.75	3.44				
Voiding symptoms	1. measurement	Normal	28	3.93	1.68	38	2.67	.011	0.92
		Obese	12	5.58	2.07				
	2. measurement	Normal	28	3.64	1.70	38	2.90	.006	1.00
		Obese	12	5.42	1.93				
Quality of life	1. measurement	Normal	28	6.93	2.29	38	0.22	.829	0.07
		Obese	12	7.08	1.31				
	2. measurement	Normal	28	4.43	2.75	38	2.21	.033	0.77
		Obese	12	6.33	1.72				

Discussion

ESWT treatment has been shown to have favorable effects on prostatitis symptoms and sexual functions in CP patients [19]. To our knowledge, there are not enough studies on how ESWT treatment is affected by factors such as age and BMI. In our study, we also examined these factors while examining the efficacy of ESWT in CP. When all patients were evaluated, ESWT made a statistically significant positive difference in pain and quality of life scores on the CP side but did not make a significant difference in voiding symptoms. In terms of sexual functions, ESWT made a statistically significant positive difference in erectile function sexual and general satisfaction scores but not in sexual desire and orgasmic function scores. In assessing the efficacy of ESWT based on age, it was determined that younger patients derived greater benefits from the treatment in terms of improvements in erectile function.. However, the age factor did not create a significant difference in terms of the ESWT effect on prostatitis symptoms. When ESWT efficacy was evaluated according to BMI values, erectile function, orgasmic function, and sexual and general satisfaction, scores increased more in normal-weight

patients compared to obese patients. In addition, normal-weight patients showed a greater decrease in prostatitis pain scores after treatment compared to obese patients. It can be said that the effectiveness of ESWT in the treatment of CP in obese patients is insufficient in terms of both prostatitis symptoms and sexual functions compared to normal-weight patients.

In our study, ESWT treatment significantly decreased pain in CP patients. The observed pain reduction is thought to be due to intracellular changes following the conversion of mechanical extracorporeal shock waves into biochemical signals [17]. It has been reported that pulsatile stimulation of pain receptors (nociceptors) by ESWT partially or completely disrupts the transmission of potential pain stimuli; ESWT overstimulates nociceptors beyond their sensitivity thresholds, resulting in numbing of sensory neurons to noxious stimuli and thus decreases pain perception [24,25]. The decrease in treatment efficacy in obese patients may be due to the fact that skin and subcutaneous tissue density in the perineum increases the distance to the prostate and thus limits the mechanotherapeutic and immunomodulatory [26] effect of ESWT on the prostate. CP

may also cause lower urinary tract symptoms similar to benign prostatic enlargement in patients [27,28]. ESWT is also effective in the treatment of these voiding symptoms [29,30]. However, in our study, although ESWT application in the treatment of CP partially benefited the voiding symptoms of the patients, no statistically significant difference was found. Similar results were observed in another study; ESWT treatment did not provide significant benefits in voiding symptoms in the long term, and urodynamics was recommended for objective evaluation [31].

Erectile dysfunction is observed in most patients with CP [32]. IIEFF was also used to evaluate the severity of patients' ED symptoms. There are many studies evaluating the effect of ESWT treatment on ED through IIEFF, and these studies have shown ESWT efficacy, especially in terms of erectile function [33,34]. ESWT stimulates the neovascularization process with hyperstimulation of nociceptors, which causes modification of nerve impulse flow and also decreases muscle tone through stimulation of nitric oxide synthesis, thus contributing to erection [35]. In our study, ESWT increased erectile function sexual and general satisfaction scores in accordance with the literature. Treatment success only in erectile function was found to be higher in young people, whereas it was lower, especially in obese people.

Some limitations should also be taken into consideration when interpreting our study. It is a single-center survey study. Variables other than age, BMI, and hormones affecting sexual functions were not studied. The follow-up period was limited to three months and is relatively short. Multicenter studies with longer follow-up periods are needed in terms of ESWT treatment for CP. Nevertheless, the efficacy of ESWT for CP has been studied, and ESWT effects, especially in obese CP patients, have been examined and contributed to the literature, albeit partially.

Conclusion

Our study showed that ESWT treatment is an effective method, especially in pain relief for CP patients. It also increases erectile function sexual and general satisfaction. It contributes more to erectile function at young ages. In obese patients, its contribution to both pain palliation and erectile function is limited. However, in order to reach clearer conclusions, prospective, randomized, multicenter, and high-participation studies are needed.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The ethics committee approval of the study was granted by Ömer Halisdemir University Non-Interventional Clinical Research Ethics Committee (no: 2023/100).

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