

Evaluating the Ability of the Modified IIEF-5 Questionnaire to Determine the Etiopathogenesis of Erectile Dysfunction

Erektıl Disfonksiyonu Olan Hastada Etiyolojinin Belirlenmesinde Modifiye IIEF-5 Formunun Etkinliğinin Belirlenmesi

Murat Bağcıoğlu¹, Ümit Yener Tekdoğan¹, Ali Omur Aydın², Mert Ali Karadağ¹, Serkan Özcan³, Sefa Güngör⁴, Ramazan Kocaaslan¹

¹Kafkas University, Department of Urology, Kars; ²Dr. Ersin Arslan State Hospital, Department of Urology, Gaziantep; ³Artvin State Hospital, Department of Urology, Artvin; ⁴Çukurova Aşım Tüfekçi State Hospital, Department of Urology, Adana, Turkey

ABSTRACT

Aim: The aim of this study, to evaluate the ability of questions added International Index of Erectile Function-5 (IIEF-5) questionnaire differentiating the underlying etiopathogenesis of erectile dysfunction (ED).

Material and Method: The questions of the modified IIEF-5 were asked the patients, and scores below 21 were considered as ED. With added questions, smoking and drinking habits and the presence of diabetes mellitus, hypertension and coronary heart disease were recorded. The masturbation habits and night erections were also questioned. The patients were then sub-divided into 3 groups, namely psychogenic, arteriogenic and cavernosal ED. The results of questionnaire were correlated with penile Doppler ultrasonography (PDU) results.

Results: The mean age of the 100 patients was 45.25±12.67, and the mean duration of ED was 40.97±58.11 months. When diagnostic ability of the modified IIEF technique was compared with PDU, the 1st, 2nd and 3rd methods accurately diagnosed 49%, 75% and 79% of the patients, respectively. The kappa correlation coefficient was 18, 57 and 73 for techniques 1, 2 and 3, respectively. IIEF scores of organic and psychogenic groups were 9.92±3.94 and 12.82±4.37 ($p = 0.001$). Mean IIEF scores of arterial ED, venous ED and psychogenic ED groups were 8.6±3.34, 12.32±3.86, 12.32±3.86, respectively and the arterial ED group was significantly different ($p < 0.001$).

Conclusion: Though the majority of the techniques to determine the etiopathogenesis of ED are invasive, modified IIEF is a simple and accurate technique, especially with the third step and useful for the urologists in their clinical practice.

Key words: modified IIEF-5; erectile dysfunction; etiopathogenesis

ÖZET

Amaç: Çalışmamızın amacı, eklenen sorularla modifiye edilmiş uluslararası erektil disfonksiyon işlevi değerlendirme formunu (IIEF-5) kullanarak erektil disfonksiyonlu (ED) hastalarda altta yatan etiyolojik faktörü öngörebilmektir.

Materyal ve Metot: Modifiye IIEF-5 formu erektil disfonksiyonu olan hastalara uygulandı ve skoru 21'in altında olan 100 hasta ED olarak

kabul edilip çalışmaya dahil edildi. Eklenen sorularla hastaların sigara ve alkol alışkanlıkları, diabetes mellitus, hipertansiyon ve koroner arter hastalıkları sorgulandı. mastürbasyon alışkanlıkları ve gece ereksiyonları da ayrıca sorgulandı. Hastalar alınan cevaplara göre psikojenik, arteriyojenik ve kavernoza ED olarak 3 alt gruba ayrıldı. Formun sonuçları penil Doppler ultrason sonuçları ile karşılaştırıldı.

Bulgular: Çalışmaya dahil edilen 100 hastanın ortalama yaşı 45,25±12,67 ve ortalama ED süresi 40,97±58,11 ay olarak hesaplandı. Modifiye IIEF-5 formunun etiyolojiyi öngören sonuçları ile penil doppler ultrasonografi sonuçları karşılaştırıldığında 1., 2. ve 3. yöntemler için hastaların sırasıyla %49, %75 ve %79'u doğru tanı aldı. kappa korelasyonu da sırasıyla 18, 57 ve 73 olarak belirlendi. Ortalama IIEF-5 skorları organik ve psikojenik gruplar için sırasıyla 9,92±3,94 ve 12,82±4,37 olarak tespit edildi ($p = 0,001$). Arteriyel, venöz ve psikojenik gruplar için ortalama IIEF-5 değerleri ise sırasıyla 8,6±3,34, 12,32±3,86, 12,32±3,86, iken arteriyel grubun sonuçlarının diğer gruptan istatistiksel olarak farklı olduğu gözlemlendi.

Sonuç: ED etiyolojisinin belirlenmesinde kullanılan yöntemlerin çoğu invaziv iken, modifiye edilmiş IIEF-5 formu ED olan hastalarda etiyolojiyi belirlemede ve tedavide ürologların klinik pratikte yararlanabileceği basit ve doğru sonuçlar veren bir testtir.

Anahtar kelimeler: modifiye IIEF-5; erektil disfonksiyon; etiopatogenez

Introduction

Erectile dysfunction (ED) affects more than 52% of men aged 40–70 years¹. It is estimated that over 152 million men worldwide are affected by ED; more than 322 million men will be affected in 2025^{2,3}. Erectile dysfunction is defined as the persistent inability to achieve or maintain penile erections of sufficient value to engage in satisfactory sexual activity⁴. The most common underlying etiologic factors of ED are organic causes, particularly vascular insufficiency and psychological causes⁵. According to pathophysiology, ED is classified as organic (vasculogenic, neurogenic, hormonal, drug-induced, or anatomic/structural), psychogenic or mixed type⁶. Commonly used

Murat Bağcıoğlu, Kafkas Üniversitesi Tıp Fakültesi Sağlık Uygulama ve Araştırma Hastanesi Üroloji Anabilim Dalı, Türkiye, Tel. 0506 202 00 66 Email. dr.muratbagcioglu@hotmail.com Geliş Tarihi: 11.03.2016 • Kabul Tarihi: 25.03.2017

diagnostic techniques – such as penile Doppler ultrasonography (PDU), nocturnal penile monitoring, intracavernosal pharmacological tests, and cavernosometry – can yield inaccurate results, and some of these techniques are invasive. Despite its disadvantages, imaging related to ED is dominated by PDU⁵. However, patient self-reported techniques, such as the simplified version of the International Index of Erectile Function (IIEF), which consists of only 5 items (IIEF-5), has been proposed as a sexual assessment method to diagnose and classify ED in clinical trials^{7,8}.

Here, we evaluate how well questions added to the IIEF-5 questionnaire can differentiate the underlying etiopathogenesis of ED. We correlated the results of the modified IIEF-5 questionnaire with the PDU results.

Material and Method

We included 132 patients with established ED in our study; we required that all of the patients in our cohort be followed up for a minimum of three months. The majority of patients were diagnosed between 2001 and 2011. All patients complained of the inability to achieve and/or maintain an erection of sufficient rigidity and duration to permit satisfactory sexual performance. We obtained a detailed medical and sexual history from each patient. We then conducted a physical examination of each patient, including an assessment of genitourinary, endocrine, vascular, and neurologic systems. We also obtained laboratory tests, including fasting glucose, a lipid profile, a morning sample of total testosterone, and PSA level, in men over the age of 45.

Exclusion criteria for this study included the presence of any neurological or hormonal (including testosterone, prolactin and thyroid hormones) disorders, a low intellect level, abnormal penile examination (Peyronie disease), a past medical history of any pelvic surgery or drug use that may cause ED and liver or kidney dysfunction. Thirty-two patients were excluded from the study based on these criteria.

The patients were informed about the aim of the study, and written informed consent was obtained from all patients. Next, we asked questions from the modified IIEF using a face-to-face technique. IIEF-5 scores below 21 were considered to be representative of ED. The questions that we added were related to smoking and drinking habits and the presence of diabetes mellitus (DM), hypertension (HT) and coronary heart disease (CHD). The patients' masturbation habits and night erections were also questioned.

We then divided the patients into three groups based on their responses to the modified IIEF-5 questions. We conducted this division using three different techniques. In the first technique, patients with a smoking history of at least 10 pack-years or patients with a history of alcohol abuse or a past medical history of DM, HT or CHD for at least 5 years were considered to represent cases of 'organic' ED; all other patients were sub-grouped as 'psychogenic' ED. The patients with organic ED were sub-classified into 2 groups as follows: patients with a chief complaint of inability to achieve a rigid erection (question 3 on the IIEF) were considered to be cases of 'arteriogenic' ED, and patients with a chief complaint of the inability to preserve an erection (question 4 on the IIEF) were considered to be cases of 'cavernosal' ED.

In the second technique, patients who maintained successful masturbation habits and night erections were considered to be 'psychogenic'. The patients in the organic group were sub-classified into 2 groups as follows: patients with a chief complaint of the inability to achieve a rigid erection (question 3 on the IIEF) were considered to be cases of 'arteriogenic' ED, and patients with a chief complaint of the inability to preserve an erection (question 4 on the IIEF) were considered to be cases of 'cavernosal' ED.

In the third technique, we modified our methodology outlined in the previous paragraph. Patients with psychogenic ED were placed in the cavernosal ED group if their chief complaint was the inability to preserve an erection. As a summary, patients were sub-divided into three groups: namely psychogenic, arteriogenic and cavernosal ED.

Patients then underwent color-Doppler ultrasonography using a Hitachi EUB 555 high-resolution imager with a 7.5 MHz linear probe. We monitored arterial and venous blood flow before and 15 minutes after a 60 mg intracavernosal papaverine injection. The following combination of maximum systolic flow (MSF) above 35 cm/second, end-diastolic flow (EDF) less than 5 cm/second and resistive index (RI = $\frac{MSH-DSH}{MSH}$) above 0.9 cm/second was considered to be a 'normal' PDU result. Patients with a MSH below 35 cm/second were considered to exhibit 'arterial insufficiency' regardless of their DSH; the remaining patients with a DSH above 5 cm/second were considered to have 'cavernosal insufficiency'.

We then compared the groups determined using the modified IIEF technique and PDU; we employed a

kappa test to make these comparisons. We set significance at 5%. Taking the PDU results as a definitive diagnosis, we compared the accuracy of the modified IIEF with the PDU results. Kappa values between 21 and 40 were considered to be 'correlated', and values between 41 and 60 were considered to be 'moderately correlated.' Values between 81 and 100 were considered to be 'highly correlated'. Furthermore, we determined sensitivity and specificity of the modified IIEF for diagnosing the three sub-groups of ED patients.

We measured the percentage distribution of risk factors according to Doppler USG. We analyzed the IIEF results of patients with psychogenic and organic ED using the Kruskal-Wallis and Mann-Whitney tests.

Results

The mean age of the 100 patients included in our study was 45.25 ± 12.67 years (range: 22–75 years), and the mean duration of ED was 40.97 ± 58.11 months (range: 3–384 months). Sixty-one patients described night erections, and 19 patients described successful masturbation. A history of DM, HT and smoking was recorded in 26, 5 and 59 patients, respectively. All of these patients except for one were older than 40. Sixty-one patients were older than 40, and 39 patients were younger than 40. The mean age of patients older than 40 was 53.34 ± 8.55 years, and the mean age of patients younger than 40 was 32.59 ± 5.75 years.

The mean duration of smoking was 254.94 ± 144.04 months, and all patients except for one had been smoking for at least 5 years.

When we compared the diagnostic ability of the modified IIEF technique with PDU, the 1st, 2nd and 3rd techniques accurately diagnosed 49%, 75% and 79% of the patients, respectively. The kappa correlation coefficient

was 18, 57 and 73 for techniques 1, 2 and 3 of the modified IIEF, respectively. The patient distribution with the modified IIEF technique is shown in Tables 1–3.

The mean IIEF scores of the organic and psychogenic groups were 9.92 ± 3.94 and 12.82 ± 4.37 , respectively ($p = 0.001$). The mean IIEF scores of the arterial, cavernosal and psychogenic ED groups were 8.6 ± 3.34 (range: 4–15), 12.32 ± 3.86 (range: 5–19) and 12.32 ± 3.86 (range: 5–19), respectively, and the arterial ED group was significantly different ($p < 0.001$). With the third division technique, which yielded the most reliable results, results that were consistent with those of PDU were obtained for 79 of the patients (79%).

Discussion

Erectile dysfunction is a problem more frequently observed in the elderly population; symptoms typically become more serious with increasing age⁹. Vasculogenic and psychogenic factors are among the more common underlying etiological factors of ED¹⁰. Smoking, DM, CHD, HT and metabolic syndrome are among the most prevalent risk factors that increase significantly the incidence of ED^{10,11}. However, the presence of more than one of these factors in the same patient and the concomitant use of drugs that may cause ED poses a challenge for identifying novel risk factors. Similarly, the chronic diseases noted above have the potential to cause psychological problems and may cause psychogenic ED.

Although the risk factors highlighted above are known to predispose a patient to ED, not all patients with these factors develop ED. It is also difficult to determine whether there is an organic component of ED in patients with these risk factors. It is less-well known whether the duration of these risk factors or the severity of these diseases are correlated with ED.

Table 1. Comparison of PDU results and etiological factors as determined by technique 1

Comparison of Step 1 and PDU	Doppler			Total
	Arterial ED	Psychogenic ED	Venous ED	
Arterial ED (N)	35	26	8	69
Psychogenic ED (N)	2	9	3	14
Cavernosal ED (N)	3	3	11	17
Total (N)	40	38	22	100

ED: Erectile Dysfunction

Table 2. Comparison of PDU results and etiological factors as determined by technique 2

Comparison of Step 1 and PDU	Doppler			
	Arterial ED	Psychogenic ED	Venous ED	Total
Arterial ED (N)	32	1	2	35
Psychogenic ED (N)	6	37	19	62
Cavernosal ED (N)	2	0	1	3
Total (N)	40	38	22	100

ED: Erectile Dysfunction

Table 3. Comparison of PDU results and etiological factors as determined by technique 3

Comparison of Step 3 and PDU	Doppler			
	Arterial ED	Psychogenic ED	Venous ED	Total
Arterial ED (N)	33	1	2	36
Psychogenic ED (N)	3	33	7	43
Cavernosal ED (N)	4	4	13	21
Total (N)	40	38	22	100

ED: Erectile Dysfunction

Diagnostic techniques, such as penile Doppler USG, cavernosometry, follow-up for nocturnal penile tumescence and penile plathysmography typically necessitate specialized, expensive equipment; many of these techniques are additionally rather invasive. Therefore, the majority of these techniques are not readily available in many clinics. For all of these reasons, the etiological factors for ED can be difficult to identify.

After PDE type 5 inhibitors became more commonly and successfully used for the treatment of ED, the search for the underlying etiology of ED has become less of an issue. Even so, it is important to note that the efficacy of some PDE 5 type inhibitors varies for different etiologies of ED^{12,13}. However, the efficacy of oral drugs to treat ED differs based on the risk factors or underlying etiologies of ED. Therefore, sufficient knowledge about the underlying etiology of ED in a patient is beneficial before starting the therapy¹⁴.

The IIEF scale is known to demonstrate the degree of ED, but this scale is unable to determine the underlying etiology unless an invasive diagnostic modality is used as an adjunct. Our results using technique 3 of the modified IIEF exhibited similar results as those recovered with PDU in 79% of our patients. This result is consistent with the findings of Hatzichristou et al. who showed that commonly used diagnostic techniques can accurately diagnose approximately 80% of patients¹⁵. Today, PDU is also considered to be one of the most common techniques for diagnosing ED¹⁶. On the other hand, the intracavitary agents used in PDU are against the normal physiological mechanisms, by their direct smooth muscle relaxing abilities; PDU accordingly has a low accuracy rate¹⁷.

Even though Tang et al. and Deveci et al. have reported that the simplified IIEF-5 is not a definitive diagnostic tool to discriminate the pathophysiological causes of ED, our data showed that this scale can be used with a modification^{18,19}. However, Cordeiro et al. concluded in their study that the IIEF-5 was associated with the diagnosis of coronary artery disease and that its use could add information risk stratification in hypertensive patients²⁰. By using the modified IIEF technique, particularly after its third technique, the underlying etiology of ED can be determined in the majority of cases. This scale is accordingly an important asset to urologists.

Although the majority of the techniques to determine the pathogenesis of ED are invasive, the modified IIEF is a simple and accurate technique, particularly after its third technique. This scale is of great use to urologists in their clinical practice.

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