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Reliability and Validity Analysis of the Turkish Version of the Danish Prostate Symptom Score in Patients with Benign Prostatic Hyperplasia

Benign Prostat Hiperplazili Hastalarda Danimarka Prostat Semptom Skorunun Türkçe Versiyonunun Geçerlilik ve Güvenirlik Analizi

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ABSTRACT Objective: Our aim is to validate the Turkish adaptation of Danish Prostatic Symptom Score (DAN PSS-1), a self-administered quality of life questionnaire comprising 12 questions related to voiding problems and the perceived bother of each individual symptom. **Material and Methods:** After the translation of the English DAN PSS-1 questionnaire into Turkish by two native Turkish physicians, 40 patients diagnosed with benign prostate hyperplasia (BPH) and 40 control group patients without any lower urinary tract complaints that had been admitted to our out-patient clinic were enrolled in the study. Stability and internal consistency of reliability of the Turkish adapted DAN PSS-1 questionnaire were measured with test-repeat-test (TRT) method Pearson correlation coefficient and Cronbach's alpha coefficient were calculated. The specificity and sensitivity of the Turkish adapted DAN PSS-1 questionnaire in diagnosis of BPH patients was measured using a discriminant validity test, utilizing the area under the ROC curve. **Results:** The stability reliability test to 40 BPH patients that had been admitted to our out-patient clinic twice at 3 week intervals. After the application of TRT reliability test Pearson correlation coefficient was calculated 90% for the overall stability of reliability (r: 0,90) and internal consistency of reliability which was measured with Cronbach's alpha coefficient was found 0.8. To diagnose the BPH patients, the 11th question had the highest (Cronbach's alpha coefficient: 0.83) and 1st question had the lowest (Cronbach's alpha coefficient: 0.76) internal consistencies respectively. When the total score was taken as 14 for cut-off value, Turkish- adapted DAN PSS-1 questionnaire sensitivity and specificity were found 74% and 78% and the area under the ROC curve was 0.88 (AUC: 0.88). **Conclusion:** The Turkish-adapted version of the DAN PSS-1 questionnaire has good internal consistency and high reliability. The Turkish-adapted DAN PSS-1 questionnaire can be applied to BPH patients and is a useful alternative to the International Prostat Symptom Score (IPSS).

Key Words: Prostatic hyperplasia; validation studies; lower urinary tract symptoms

ÖZET Amaç: Bu çalışmada, benign prostat hiperplazili (BPH) hastalarda; 12 sorudan oluşan, hastaların işeme şikâyetlerini ve rahatsızlıklarını sorgulayan, hastaların kendileri tarafından doldurabildikleri Danish Prostat Semptom Skoru formunun (DAN PSS-1) Türkçeye uyarlamasının, validasyon analizlerinin yapılması amaçlanmıştır. **Gereç ve Yöntemler:** İngilizce DAN PSS-1 formu iki Türk doktor tarafından Türkçeye çevrildikten sonra uygulanmak üzere, BPH tanısı konulan 40 hasta ile alt üriner sistem şikâyeti olmayan 40 kontrol hastası çalışmaya alınmıştır. Türkçeye uyarlanan DAN PSS-1 formunun güvenilirliğinin analizi için test-retest (T-RT) metodu kullanılarak Pearson korelasyon katsayısı ve iç tutarlılığının değerlendirilmesi amacıyla ise Cronbach alfa katsayısı hesaplanmıştır. DAN PSS-1 formunun özgüllük ve duyarlılık yüzdeleri ise ROC eğrisinin altında kalan alan kullanılarak saptanmıştır. **Bulgular:** DAN PSS-1 formunun geçerlilik ve güvenilirlik testi için polikliniğimize başvuran 40 BPH hastası 3 hafta arayla iki kez kabul edilmiştir. T-RT güvenilirlik testi sonrası, DAN PSS-1 formunun güvenilirliğinin Pearson korelasyon katsayısı hesaplanarak %90 olarak bulunmuş (r:0,90), güvenilirliğin iç tutarlılığının analizinde ise Cronbach alfa katsayısı 0,80 olarak saptanmıştır. BPH'lı hastaları saptamada en yüksek iç tutarlılığı olan sorunun 11. soru olduğu (Cronbach alfa katsayısı: 0,83), en zayıf iç tutarlılığı olan sorunun ise 1. soru (Cronbach alfa katsayısı: 0,76) olduğu görülmüştür. Geçerlilik testlerinde ise; toplam skor için kesme değeri 14 alındığında, Türkçeye uyarlanmış DAN PSS-1 formunun duyarlılığı %74, özgünlüğü ise %78 olarak saptanmıştır. ROC eğrisi altında kalan alan ise 0,88'dir (AUC:0,88). **Sonuç:** DAN PSS-1 formunun Türkçeye uyarlanmış modeli iyi bir iç tutarlılık ve yüksek güvenilirlik göstermiştir. Türkçeye uyarlanmış DAN PSS-1 formu BPH hastalarının tanısını koymak amacıyla International Prostat Semptom Skoru (IPSS) formuna alternatif olarak kullanılabilir.

Anahtar Kelimeler: Prostat hiperplazisi; doğrulama çalışmaları; alt üriner sistem semptomları

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Benign prostatic hyperplasia (BPH) is the most common cause of obstruction in the etiology of lower urinary tract symptoms (LUTS) in older males.[1] Quality of life in patients with BPH can be negatively affected by the symptoms associated with obstruction of the lower urinary tract. Long term studies performed by Garraway et al., found that more than 20% of male patients older than 40 years have LUTS related complaints and that the quality of life of these patients is decreased.[2] However, there is little available information on the relative impact of LUTS symptoms.[3] Therefore, identification of the most bothering factors could improve the patients' quality of life.[4]

To diagnose and to measure the efficacy of the applied treatments in BPH patients the Danish Prostate Symptom Score (DAN PSS-1) were developed in 1991.[5] Unlike other questionnaires, the frequency of symptoms and their effect on quality of life are examined by the DAN PSS-1. In the previous Boyarsky, Madsen and Iversen questionnaires, patients' complaints are classified as obstructive or irritative.[6,7] In these questionnaires, only the degrees of LUTS can be determined but the specific complaints of the patients cannot be determined. The bother rating is also evaluated in the DAN PSS-1 questionnaire and another unique aspect of the DAN-PSS-1 is that it can be self-administered.

Here, we investigated the validity and reliability of a Turkish adaption of the DAN PSS-1 questionnaire in BPH patients (Table 1).

MATERIAL AND METHODS

ADAPTATION OF DAN-PSS-1 QUESTIONNAIRE INTO TURKISH

After gaining approval from the Ethics Committee, the English DAN PSS-1 questionnaire was translated into Turkish by two native Turkish physicians. Then, the Turkish adapted DAN PSS-1 questionnaire was back-translated to English by another physician (also native Turkish, who will not have read the original text). A final form of the text was produced after the writer made corrections specific to the Turkish culture.

PATIENT SELECTION AND DATA COLLECTION

The local ethics committees of the Okmeydanı Training and Teaching Hospital approved the study. Between March 2014 and July 2015, 80 patients were prospectively included into the study and completed the questionnaires. Inclusion criteria were (1) patient age between 40 and 80 years, (2) written informed consent and (3) LUTS complain.Exclusion criteria were (1) a history of, or current treatment for, overactive bladder, LUTS, urinary incontinence, voiding disorders, chronic prostatitis, chronic pelvic pain and prostate cancer, (2) concomitant medication with alpha blockers, antimuscarinics, analgesics or other drugs potentially interfering with LUT function, (3) permanent or (4) bilateral ureteral stenting, (5) debilitating disease or (6) insufficient language skills.

DANISH PROSTATE SYMPTOM SCORE QUESTIONNAIRE

The DAN PSS-1 questionnaire consists of 12 questions that review urinary bladder storage and urinary functions. For each question, there is a complaint rating score and bother rating score. Each question is answered on a scale of 0 to 3, according to the severity of complaint. The bother rating of every complaint is also rated between 0 and 3 under a new question title. The total score is calculated by multiplying the complaint and bother scores (maximum score of 9). Therefore, even if complaint severity is high, the total score would be zero if the complaint causes no discomfort. The questionnaire's total score can range between 0 and 108 (Table 2).

STATISTICAL ANALYSIS

Reliability was evaluated by internal consistency (tested by Cronbach alfa) and test-retest reliability between week 1 and 3 (tested by Spearman correlation). Discriminant validity was evaluated by comparing the results of BPH patients with those of healthy subjects with utilizing the area under the ROC curve.

We planned to work at 80% power and 95% confidence. Fourty cases were included in the control group with the assumption that the scale subdimensions between the case and the control

TABLE 1: Turkish adaption of the DAN PSS-1 questionnaire.

1-A Duraksama	İşemeye başlamak için beklemeniz gerekiyor mu	Hayır: 0	Nadiren: 1	Günlük: 2	Her zaman: 3
1-B	Eğer işemeye başlarken beklemeniz gerekiyorsa, bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Her zaman: 3
2-A Zayıf akım	İdrar akım hızınızın nasıl olduğunu düşünüyorsunuz?	Hayır: 0	Zayıf: 1	Çok zayıf: 2	Damlama şeklinde: 3
2-B	Eğer idrar akım hızınız zayıf ya da damlama şeklinde ise bu sizin için problem oluyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
3-A Yetersiz boşaltım	İşemeniz bittiğinde mesanenizin tamamen boşaldığını hissediyor musunuz?	Her zaman: 0	Çoğunlukla: 1	Nadiren: 2	Asla: 3
3-B	Eğer işemeniz bittiğinde mesanenizin tamamen boşalmadığını hissediyorsanız, bu sizin içinproblem oluyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
4-A Ikınma	İşemeyi başlatırken ya da sürdürürken ıkınıyor musunuz?	Hayır: 0	Nadiren: 1	Cün içi: 2	Her zaman: 3
4-B	Eğer işemeyi başlatırken ya da sürdürürüken ıkınıyorsanız bu sizin için problem oluyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
5-A Gün içindeki işeme sıklığı	Gün boyunca işemeleriniz arasındaki en uzun aralık kaç saattir? (Uyandıktan gece yatana kadar)	3 saatten fazla: 0	2-3 saat arası: 1	1-2 saat arası: 2	1 saatten az: 3
5-B	İşeme sıklığınız sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
6-A Gece işeme	Gece işeme sıklığınız nedir?	Hiç: 0	1-2 kez: 1	3-4 kez: 2	5 kez ya da daha fazla: 3
6-B	Eğer gece işemeye kalkıyorsanız; bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
7-A Ani sıkışma	Ani sıkışma hissi ile işediğiniz oluyor mu?	Hayır: 0	Nadiren: 1	Gün içi: 2	Her zaman: 3
7-B	Eğer ani sıkışma hissi ile işediğiniz oluyorsa, bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
8-A Yetişemeyerek idrar kaçırma	Ani sıkışma hissi geldiğinde tuvalete yetişene kadar idrar kaçırıyor musunuz?	Hayır: 0	Nadiren: 1	Günlük: 2	Her zaman: 3
8-B	Eğer ani sıkışma hissi geldiğinde tuvalete yetişene kadar kaçırıyorsanız, bu sizin için problem oluyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
9-A Ağrılı işeme	İşeme sırasında ağrı ya da yanma hissi oluyor mu?	Hayır: 0	Nadiren: 1	Gün içi: 2	Her zaman: 3
9-B	Eğer işeme sırasında ağrı veya yanma hissi oluyorsa bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
10-A İşeme sonrası damlama	İdrarınızı yaptıktan sonra işemenizin bittiğini hissttiğiniz halde damlama oluyor mu?	Hayır: 0	Nadiren: 1	Pantolonuma çok az: 2	Pantolonuma çok fazla: 3
10-B	İdrarınızı yaptıktan sonra işemenizin bittiğini hissettiğiniz halde damlama oluyorsa bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
11-A Stres inkontinans	Fiziksel aktiviteleriniz sırasında (ağır kaldırma, hapşırma, öksürme) idrar kaçırdığınız oluyor mu?	Hayır: 0	Nadiren: 1	Sıklıkla: 2	Her zaman: 3
11-B	Eğer fiziksel aktiviteleriniz sırasında (ağır kaldrma, hapşırma, öksürme) idrar kaçırıyorsanız bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3
12-A Taşma inkontinansı	Fiziksel aktivitede bulunmadan veya işeme isteğiniz olmadan idrar kaçırdığınız oluyor mu ?	Hayır: 0	Nadiren: 1	Sıklıkla: 2	Her zaman: 3
12-B	Eğer fiziksel aktivitede bulunmadan veya işeme isteğiniz olmadan idrar kaçırıyorsanız, bu sizin için problem yaratıyor mu?	Hayır: 0	Hafif problem: 1	Orta problem: 2	Ciddi problem: 3

TABLE 2: Total score calculation.

Symptom Score 6. Question (Nocturia)	Point	Bother Score	Point
[1]***None***	0	No problem	0
1 to 2 times	1	Small problem	1
3 to 4 times	2	Moderate problem	2
5 times or more	3	[1]***Major problem***	3

[1] 6.***Question Score***: 0x3=0.

groups were between 0.65-0.70 standard effect sizes. In the case group, 40 cases with BPH in 3 months were taken into survey. The software SPSS 20.0 for Windows (SPSS, Chicago, IL) was used for the study purposes.

RESULTS

RELIABILITY

For an evaluation instrument to be considered, it should produce similar results in subsequent measurements. Stability and internal consistency are the components of reliability. Here we used Pearson coefficient and Cronbach alpha coefficient to measure stability and internal consistency respectively.

The reliability of a questionnaire can be tested by submitting the same question multiple times at greater than 1 week intervals.[8] Using the test-retest (TRT) method, the reliability of the English DAN PSS-1 questionnaire has been previously demonstrated by Brasso et al. and Barry et al. as 83.5% and 81% (67-91%) respectively.[9,10] Here we applied the stability reliability test to 40 BPH patients that had been admitted to our outpatient clinic twice at 3 week intervals. We found higher percentage of reliability in patients with lower total scores. The median test-retest reliability of answers to each question was 90% (range 0-97%) after the application of TRT reliability test (Pearson correlation coefficient r: 0,90), thus the questionnaire was well understood by the patients (Figure 1).

A questionnaire's internal consistency depends on the relationship between the questions in the questionnaire and is measured using the Cronbach's alpha coefficient.[11] While the most related question about the abstract in the questionnaire has the highest Cronbach alpha coefficient, least related question has the lowest Cronbach alpha coefficient. Removal of the least related questions from the questionnaire increases the questionnaires median Cronbach alpha coefficient, resulting in a more internally consistent questionnaire. Bolognese et al. stated that the Cronbach alpha coefficient should be higher than 0.7.[12] In the internal consistency study of the English DAN PSS-1 questionnaire, the Cronbach alpha coefficient is determined as 0.73.[13] While an International prostate

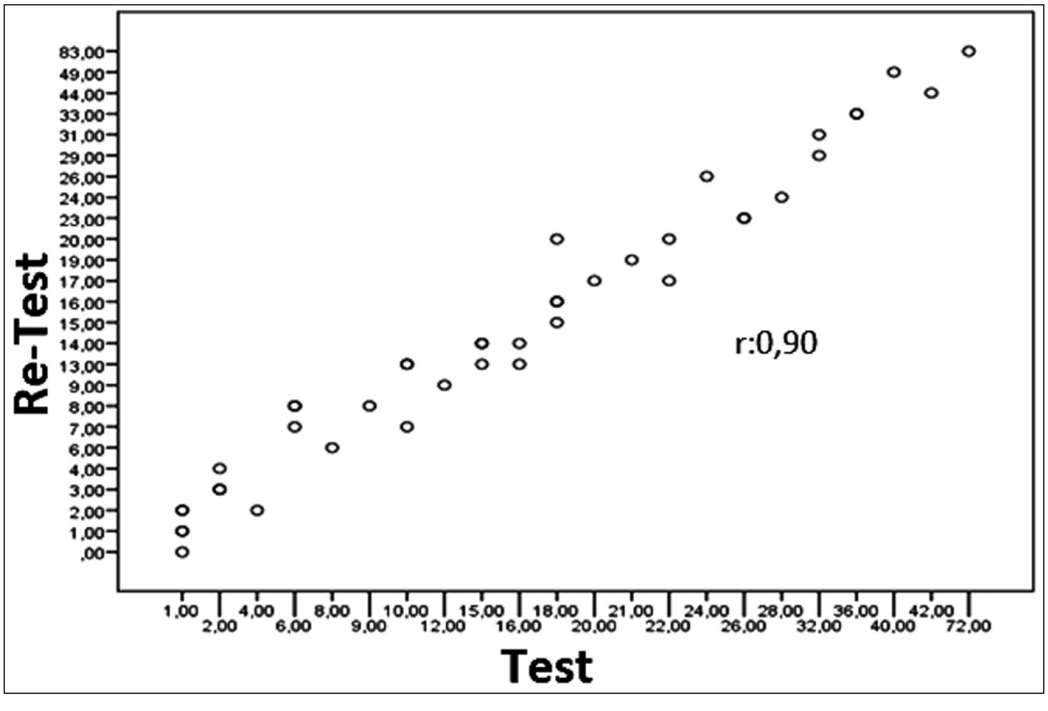

FIGURE 1: TRT reliability test (Pearson correlation coefficient r: 0.90).

symptom score (IPSS) validation study estimated a Cronbach alpha coefficient of 0.85 for the English DAN PSS-1.

In an internal consistency reliability test performed for the validation of the Turkish DAN PSS-1 questionnaire performed here, the median Cronbach alpha coefficient was 0.8. When the 12 questions were examined separately, 11th and 1st questions had the highest (0.83) and lowest (0.76) internal consistencies respectively (Figure 2). These questions are the most powerful questions to distinguish BPH patients from others. As a result, the system was internally consistent (Cronbach alpha = 0.8).

Based on these data we propose that the Turkish adaptation of the DAN PSS-1 questionnaire is well understood by the patients and it is reliable in measuring the complaints of LUTS caused by BPH.

VALIDITY

Validity is the ability of an evaluation instrument to measure the feature correctly, without the interference of any other feature. In this study, the specificity and sensitivity of the Turkish- adapted DAN PSS-1 questionnaire in diagnosis of BPH patients was measured using a discriminant validity test, utilizing the area under the ROC curve.[14]

Two groups with equal educational status and of similar ages were established. Forty BPH patients who had been submitted to our clinic with LUTS complaints were included in Group 1 and another 40 patients without LUTS complaints were included in Group 2 (a control group). There was no statistically significant difference between the average ages of the two groups in the validity tests performed. Both groups completed the Turkish-adapted DAN PSS-1 questionnaire.

Cut off values of total scores for the highest sensitivity and specificity percentages were shown in Table 3. When the total score was taken as 14, Turkish-adapted DAN PSS-1 questionnaire was able to separate BPH patients from other patients with 74% sensitivity and 78% specificity. ROC analysis was shown in Table 3, area under the curve was calculated 0,88 (Area under curve: 0,88).

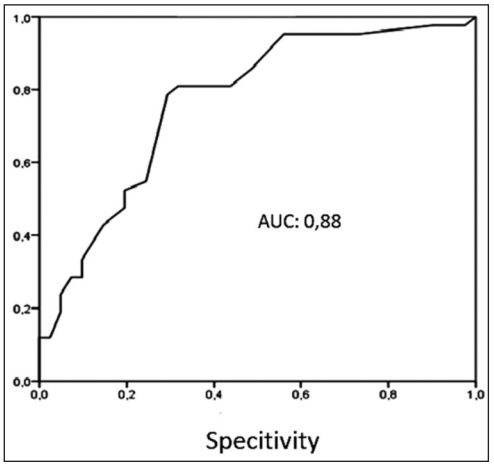

FIGURE 2: ROC analysis of the Turkish-adapted DAN-PSS-1 (AUC:0,80).

TABLE 3: The cut off values of total DAN PSS-1 scores which were obtained from ROC curve analysis and their sensitivity and specificity percentages.

Cut off score	Sensitivity (%)	Specificity (%)
12	80	65
13	76	70
¥14	¥74	¥78
15	66	83

¥Cut off score: 14.

The patients were separated into two groups in reliability of American urological association (AUA) symptom score; in this study, AUA symptom score could separate BPH patients from others with 85% specificity.[8] There was statistically significant difference between the average ages of the two groups. Patients without LUTS complaints were included into the first group, while the BPH patients were included into the second group. Although the area under the ROC curve was calculated as 0.85, the average age of the control group (48) was lower than in the BPH group (58). In our study, there was no statistically significant difference between the average ages of the two groups in the validity tests performed.

The DAN PSS-1 system discriminated clearly between patients with benign prostatic hyperplasia and control subjects (an area under the receiver operating characteristic curve of 0.88).

DISCUSSION

Here we found that a Turkish-adapted DAN PSS-1 questionnaire is reliable and valid in diagnosing BPH patients. In a study conducted by Lepor, it is mentioned that the AUA symptom score is not only specific for BPH, because unselected females between 55-79 years of age also generated high symptom scores.[15] AUA symptom index cannot differentiate BPH patients from the ageing women group.

In a study by Yalla et al. the IPSS symptom score was compared between BPH patients and patients with detrusor instability (as diagnosed using a video urodynamic test).[16] Yalla et al. found that the IPSS symptom score cannot differentiate BPH and detrusor instability. Also in a pressure-flow study conducted by Poulsen with the DAN PSS-1 questionnaire, the DAN PSS-1 questionnaire was unable to differentiate patients with obstruction demonstrated by urodynamic test from the patients without obstruction.[17] Based on these data, neither the IPSS nor the DAN PSS-1 is suitable for diagnostic purposes.

The IPSS questionnaire differs from the DAN PSS-1 questionnaire in that the DAN PSS-1 can be self-administered. Although there is an approximately 5-point difference between the total scores when conducted with a physician and by the patient alone.[18] IPSS questionnaire total score could be 5 point lower if it is conducted by the patient alone. But in another study done by Lin et al, they reported that self-administered questionnaires have many limitations including low response rate, skewed sampling, lack of control of the survey environment, and the potential that questions were misunderstood.[19] Thus, the face-to-face interviews had used in their study provided more reliable survey responses.

In a study published by Hansen, the DAN PSS-1 questionnaire and IPSS symptom scores were compared between post-therapy treatment and follow up (TUR-P or alpha blocker medical treatment).[20] Patients treated with TUR-P completed both of the questionnaires before the operation again 12 months after the operation. Hansen et al. reported a 57% decrease in the total DAN PSS-1 score and a 15% decrease in the total IPSS score at follow up. The reason of this difference is due to the lack of questions that evaluate bother symptoms in IPSS symptom score. Urinary findings are more determined in IPSS symptom score. IPSS is more evaluative towards urination functions; on the other hand, DAN PSS-1 allows the evaluation of urinary tract storage functions as well as urination functions equally.

In the study conducted by Müntener et al, the effectiveness of the TUR-P surgery were assessed by DAN PSS-1 in patients with benign prostatic hyperplasia.[21] The patients' DAN PSS-1 was obtained before and 4 months after TURP (via mailed questionnaires). The mean total DAN PSS-1 before and 4 months after surgery was 25.2 and 6.2, respectively (P<0.001). Müntener had confirmed that DAN PSS-1 could be a useful tool to assess the effectiveness of treatment in patients with benign prostatic hyperplasia. In addition BPH patients' follow-up can be done with DAN PSS-1.

Another disadvantage of the IPSS symptom score is the risk of treating patients that are without discomfort. Although a patients' IPSS symptom score could be high, they might consider this normal for them. Whereas, other patients with problems in urinary tract storage functions can be submitted to the clinic for complaints of incontinence. The IPSS symptom scores cannot diagnose bladder storage functions, thus leading to low scores.[22]

At the same time DAN PSS-1 is used for measuring lower urinary tract symptoms after stroke. LUT symptoms as nocturia, increase frequency and urinary incontinence are common symptoms with major impact on quality of life in stroke survivors. There is no gold standard for measuring the prevalence, severity and bother of LUTS in stroke patients. However, DAN PSS-1 questionnaire has recently been introduced in a survey of LUTS among stroke patients.[23]

Symptom scoring questionnaires in the diagnosis of BPH and LUTS are becoming increasingly important. The assessment of the impact of LUTS complaints on the quality of life is the most valuable component of the questionnaires. Thus, the International Continence Association (ICS) has

been working on a questionnaire similar to the DAN PSS-1 questionnaire since 1997, although this has not yet to be made available.[24]

In conclusion, the Turkish-adapted version of the DAN-PSS-1 questionnaire has good internal consistency and high reliability. Therefore, the Turkish-adapted DAN PSS-1 questionnaire can be applied to BPH patients with LUTS and is a useful alternative to the IPSS.

Conflict of Interest

Authors declared no conflict of interest or financial support.

Authorship Contributions

Conception and Design: *Hasan Anıl Atalay, Erkan Merder;* ***Acquisition of Data:*** *Hasan Anıl Atalay, Erkan Merder;* ***Analysis and Interpretation of Data:*** *İlter Alkan, Hasan Anıl Atalay;* ***Drafting the Article:*** *Volkan Ülker, Ünsal Özkuvancı;* ***Final Approval of the Completed Article:*** *Fatih Altunrende, Lütfi Canat.*

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