Assessment of the Boston Questionnaire in Diagnosis of Idiopathic Carpal Tunnel Syndrome: Comparing Scores with Clinical and Neurophysiological Findings

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SUMMARY

Aim: In this study we aimed to make a comparison of Turkish version of Boston Questionnaire (BQ) scores with clinical and electrophysiological findings in idiopathic carpal tunnel syndrome.
Method: Hundred patients with idiopathic carpal tunnel syndrome were included in the study. BQ was applied for all the patients. Data were compared with visual analogue scale (VAS) and electrophysiological severity scale (ESS).
Results: Eighty-six of patients were female and 14 were male with mean age 44.1±9.72. A statistically significant correlation between BQ and VAS and EES scores was obtained ($p<0.05$). By increase in BQ scores, electrophysiological findings were obtained matching with more severe CTS.
Conclusion: The Turkish version of BQ is a successful questionnaire. Our study showed that, BQ could safely and easily be used in both clinical and scientific studies in follow-up of the patients treated for carpal tunnel syndrome.

Key Words: Carpal Tunnel Syndrome, Boston Questionnaire, Turkish Version.

İdiopatik Karpal Tünel Sendromunda Boston Anketinin kullanılması: Skorlarının Klinik ve Nörofizyolojik Bulgular ile Karşılaştırılması

ÖZET

Amaç: Bu çalışmada, idiopatik karpal tünel sendromunda, Boston Anketinin (BA) Türkçe versiyonunun ankette elde edilen skorlarının klinik ve elektrofizyolojik bulgularla karşılaştırılmasını yapmayı amaçladık.
Yöntem: İdiopatik karpal tünel sendromlu 100 hasta çalışmaya alındı. Hastaların hepsine BA'i uygulandı. Alınan sonuçlar vizüel analog skala (VAS) ve elektrofizyolojik ciddiyet skalası (ESS) ile karşılaştırılarak değerlendirildi.
Bulgular: Toplam 100 olgunun 86'sı kadın, 14'ü erkekti. Ortalama yaşları 44.1±9.72 olarak değerlendirildi Hastalara uygulanan BA skorları ile VAS ve ESS arasında anlamlı bir ilişki saptandı ($p<0.05$). Hastaların BA skorları arttıkça elektrofizyolojik olarak da ağır derecelerde KTS'u ile uyumlu bulgular elde edildi.
Sonuç: BA'nin Türkçe versiyonu başarılı bir ankettir. Verilerimiz, BA'nin Türkçe versiyonunun, KTS'nun hem klinik hem de bilimsel çalışmalarda hastaları takip etmek için kolay ve güvenle kullanılabileceğini göstermiştir.

Anahtar Kelimeler: Karpal Tünel Sendromu, Boston anketi, Türkçe versiyon

INTRODUCTION

Carpal tunnel syndrome (CTS) is the most common compression neuropathy, estimated to occur in 4% of the general population with a higher prevalence in women (3% to 5,6%) than men (0,6 to 2,8%) depending on diagnostic criteria used (1,2). Golden standard for the diagnosis is the combination of the clinical findings and the electrophysiological study (3,4). Self-administered questionnaires are not diagnostic, but provide information about the degree of discomfort a disease causes a patient or the severity of symptoms from the patient's point of view (5). The Boston Questionnaire (BQ) is a disease-specific measure of self-reported symptom severity and functional status. It is frequently used in the reporting of outcomes from trials into interventions for carpal tunnel syndrome.

The purpose of this study is to investigate the relationship between the VAS, BQ and

electrodiagnostic findings of patients who were diagnosed as carpal tunnel syndrome (CTS) with electrodiagnostic study.

PATIENTS AND METHODS

Patients

The Turkish version of the BQ was tested on 100 consecutive patients (14 men and 86 women) who were admitted to our hospital with idiopathic CTS. Patients were excluded in the presence of other diseases that could be related to CTS (e.g. diabetes, polyneuropathy, endocrine diseases, etc.). Only idiopathic CTS (with no etiologic factors) were included. Pain severity was assessed by Visual Analogue Scale (VAS 0-100 cm).

The Boston Questionnaire

The questionnaire comprises two parts, namely the Symptom Severity (SSS) and the Functional Status Scale (FSS). In the SSS, there are 11 questions; responses may be scored one (mildest) point to five (most severe) points. The overall result is the calculated mean of all 11 scores. In the FSS, there are eight questions assessing the difficulty in performing selected activities. The overall score for functional status is calculated as the mean of all eight (6). Thus, a higher symptom severity or functional status score indicates worse symptoms or dysfunction.

Neurophysiological examination

CTS was diagnosed according to American Academy of Neurology criteria, already reported in detail (7), which include clinical history, symptoms and neurographic evidence of slowing of distal median nerve conduction velocity (8). Motor conduction velocity (MCV) of the median nerve from elbow to wrist and Distal motor latency (DML) at a distance of 7 cm were measured with surface recording electrodes on the motor point of the abductor pollicis brevis muscle. Surface recording electrodes and stimulating ring electrodes were used to assess sensory conduction study. Sensory conduction velocity (SCV) of the median nerve was measured from third finger to wrist (M3) and fourth finger to wrist (M4). The amplitude of sensory action potentials (SAP) was measured peak to peak and the amplitude of compound muscle action potentials (CMAP) was calculated from the origin of the potentials to the negative peak. Skin temperature of the arm was kept constant above 32°C with an infrared lamp (7).

For electrophysiological severity of CTS, another ordinal ESS was utilized. The scale considers normal and delayed values of median nerve SCV and DML as well as presence or absence of SAP and CMAP. It is a five point scale with 5 stages of severity (9):

1-Median nerve SCV and DML normal but significant difference in SCV between U4 and M4;
2-Slowing of SCV, normal DML
3-Slowing Of SCV and DML
4-Absence of M3 and M4 SAP slowing of DML
5-Absence of SAP and CMAP

Analyses

All statistical analyses were performed using the SPSS version 13.0 for Windows computer software package. A level of $p<0.05$ was statistically significant. Correlation of the total scores between two successive administrations was measured with the Pearson correlation coefficient and use as a measure of reproducibility.

RESULTS

The number of consecutive patients with only idiopathic CTS was 100, (86 female, 14 male, mean age 44.1 years (range 22-67), median duration symptoms 18 months (range 4-22 months) (Table I).

Table I. Demographic data for 100 patients with carpal tunnel syndrome

Patients	*n* (%)
Sex	
Women	86 (86)
Men	14 (14)
Occupation	
Housewife	53 (53)
Working in Office	36 (36)
Retired	11 (11)
Median duration symptoms	18 (4-22)
Dominant hand	
Right	76(65)
Left	24(24)

According to electrophysiological classification, 18% of patients were Grade 1, 33% were Grade 2, 33% were Grade 3, 12% were Grade 4 and 4% were Grade 5. Clinical findings were evaluated according to Boston Scale. When Boston scale scores were compared with electrophysiological findings, a statistically significant correlation was obtained ($p<0.05$). Boston scale score was found to be parallel to those electrophysiological abnormalities**.** All

Table II. Correlation between the Boston Questionnaire scores and VAS and electrophysiological examination

	Symptom Severity Scale		Fonctional Status Scale	
	Correlation coefficients (r)	p-value	Correlation coefficients (r)	p-value
VAS	0.48	0.0001	0.39	0.0001
Electrophysiological severity scale	0.82	0.000	0.77	0.000

Patients completed the questionnaire with no difficulty and described the Boston Questionnaire to be simple and easy to understand.

The FSS scores had a high correlation with scores of the symptom severity scale indicating that patients who had severe symptoms had major functional limitations. The SSC had good correlation with VAS (r:0.48, p: 0.0001) and good correlations with electrophysiological severity scale (r:0.82, p: 0.000). The FSS status scores had a moderate correlation with VAS (r: 0.39, p: 0.0001) and good correlations with electrophysiological severity scale (r:0.77, p: 0.000).

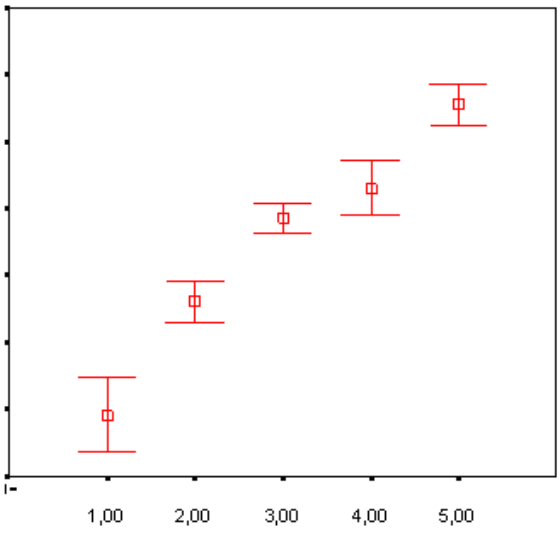

Figure 1. Graphic demonstrates a strong correlation of Boston Questionnaire and electrophysiological severity scale

All correlations were within our expectations, that worse scores for SSC and FSS were associated with more severe impairment, stronger correlations were associated with the physical, pain and electrophysiological severity scales. Correlation coefficients are presented in Table II.

DISCUSSION

In our study, there is a higher predominance of female patients with CTS with a ratio of 8,6:1,4 compared to other studies (9,10). The mean age at the time presentation is similar to that of other studies and follows a normal distribution (11).

In the assessment of CTS patients, which releaved six different carpal tunnel outcome measures (Boston Carpal Tunnel Questionnaire (BQ), Michigan Hand Outcome Questionnaire (MHQ), Disability of Arm, Shoulder and Hand (DASH), Patient Evaluation Measure (PEM), clinical rating scale (Historical-Objective (Hi-Ob) scale) and Upper Extremity Functional Scale (UEFS) (12).

In some studies comparing the efficacy and investigating the superiority, it was reported that, superiority was variable regarding cultural differences and comfort in application but a significant superiority was not present among these tests. However Sanbandam et al stated that BQ was an ideal test for CTS (12, 13, 14).

It is a great importance to choose the appropriate techniques and parameters for the management of CTS. Electroneuromyographic (ENMG) is the most sensitive technique in the diagnosis of CTS. Some authors use it not only for diagnosis but also to pursuit the outcome (13, 14). However most of the authors think that, ENMG had a poor relation with patient satisfaction and clinical appearance after treatment (15,16). Surgical complications like scares or formation of a neuroma do not alter the nerve transmitting studies but results in some disturbing symptoms (14). Thus, some inquiries, evaluating the symptoms and functional status were developed in order to be used in the follow up of patients with CTS. In this study, with performing the electrodiagnostic tests, we also preferred to use the BQ.

In the literature there are studies comparing the electrophysiological findings and BQ after median nerve decompression surgery and it seems that

BQ is a postoperative test rather than a preoperative one. These studies showed that BQ could be used safely after carpal tunnel surgery (17, 18, 19). There are numerous conservative treatment modalities in CTS like physical therapy, splinting, and local steroid injection. In some studies, BQ was used instead of ENMG in follow-up of these patients (20, 21). We found that results of our study were matched with the literature data.

The validity of the original version of the Boston Questionnaire was assessed with VAS and sensory conduction velocity of the median nerve. We also, determined that both SSS and FSS had good correlations with bodily pain and electrophysiological examination. That is; worse symptoms or dysfunctions correlated with worse state of health.

In conclusion, our results display that the Turkish version of the BQ is a valid region specific outcome measure and this questionnaire can provide a standardized measure of symptom severity and functional status in patients with the CTS.

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Appendix
Boston sorgulama formu
Semptom Şiddet Skalası

Aşağıdaki sorularda, son iki hafta süresince tipik 24 saatlik bir dönemdeki semptomlarınızı gösteren bir cevabı daire içine alınız.

Gece el veya elbileği ağrınızın derecesi nedir?
1-Gece el veya elbileğinde ağrı olmuyor
2-Hafif ağrı
3-Orta derecede ağrı
4-Şiddetli ağrı
5-Çok şiddetli ağrı

Son iki hafta içinde el veya elbileği ağrısı nedeniyle bir gecede ortalama kaç defa uyandınız?
1-Hiç
2-Bir defa
3-İki-üç defa
4-Dört-beş defa
5-Beş defadan fazla

Gündüz el veya elbileğinizde ağrınız oluyor mu?
1-Gündüz hiç ağrım olmuyor
2-Gün içinde hafif ağrım oluyor
3-Gün içinde orta derecede ağrım oluyor
4-Gün içinde şiddetli ağrım oluyor
5-Gün içinde çok şiddetli ağrım oluyor

Gündüz kaç defa el veya elbileğinizde ağrınız oluyor?
1-Hiç
2-Günde bir-iki defa
3-Günde üç-beş defa
4-Günde beş defadan fazla
5-Devamlı ağrım oluyor

Gündüz bir ağrı dönemi ortalama ne kadar sürüyor?
1-Gündüz hiç ağrım olmuyor
2-10 dakikadan az
3-10-60 dakika arası
4-60 dakikadan daha uzun
5-Gündüz devamlı ağrı oluyor

Elinizde hissilik (duyu kaybı) var mı?
1-Hayır
2-Hafif hissizlik var
3-Orta derecede halsizlik var
4-Ciddi derecede hissizlik var
5-Çok ciddi derecede hissizlik var

El veya elbileğinizde güçsüzlük var mı?
1-Güçsüzlük yok
2-Hafif güçsüzlük var
3-Orta derecede güçsüzlük var
4-Ciddi güçsüzlük var
5-Çok ciddi derecede güçsüzlük var

Elinizde karıncalanma hissi oluyor mu?
1-Olmuyor
2-Hafif karıncalanma oluyor
3-Orta derecede karıncalanma oluyor
4-Ciddi derecede karıncalanma oluyor
5-Çok ciddi derecede karıncalanma oluyor

Elinizdeki his kaybı ve karıncalanma gece ne kadar şiddetli oluyor?
1-Gece karıncalanma ve his kaybı olmuyor
2-Hafif
3-Orta
4-Ciddi derecede karıncalanma oluyor
5-Çok ciddi derecede karıncalanma oluyor

Son iki hafta içinde ortalama bir gecede kaç kez elinizde his kaybı veya karıncalanma ile uyandınız?
1-Hiç

2-Bir defa
3-İki-üç defa
4-Dört-beş defa
5-Beş defadan fazla

Anahtar veya kalem gibi küçük resimleri tutmak ve kavramakta zorluk çekiyor musunuz?
1-Hayır
2-Hafif zorlanıyorum
3-Orta derecede zorlanıyorum
4-Şiddetli zorlanıyorum
5-Çok şiddetli zorlanıyorum

Fonksiyonel Durum Skalası

Son iki hafta içinde sıradan bir günde, el ve elbileği şikayetleriniz aşağıdaki aktiviteleri yapmakta ne kadar zorluk çekmenize sebeb oldu? Aktiviteyi yapabilirliğinizi en iyi tanımlayan rakamı yuvarlak içine alınız.

Yazı yazmak 1 2 3 4 5
Giysilerin düğmesini iliklemek 1 2 3 4 5
Okurken kitabı tutmak 1 2 3 4 5
Telefon ahizesini tutmak 1 2 3 4 5
Kavonoz açmak 1 2 3 4 5
Alışveriş torbalarını taşımak 1 2 3 4 5
Günlük ev işleri 1 2 3 4 5
Banyo yapmak ve giyinmek 1 2 3 4 5

1-Zorlanmadan
2-Hafif zorlanarak
3-Orta derecede zorlanarak
4-Şiddetli zorlanarak
5-El veya elbileği şikayetlerim nedeniyle hiç yapamıyorum**.**

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