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Turkish Adaptation of the Patient Version of the Tele-Pulmonary Rehabilitation Acceptance Scale

Pulmoner Telerehabilitasyon Kabullenme Skalası-Hasta Versiyonu'nun Türkçe Adaptasyon ve Validasyon Çalışması

Mustafa Hüseyin TEMEL[a], Ayhan KUL[b], Elif ÖZYİĞİT[c], Fatih BAĞCIER[d]

[a]Üsküdar State Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye
[b]Atatürk University Research Hospital, Clinic of Physical Medicine and Rehabilitation, Erzurum, Türkiye
[c]Kanuni Sultan Süleyman Training and Research Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye
[d]Başakşehir Çam and Sakura City Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye

ABSTRACT Objective: Pulmonary telerehabilitation (TR) has been described in academic literature as a beneficial and efficient form of treatment. The acceptance level of patients regarding TR plays a crucial role in their compliance and the benefits they receive. This study aimed to translate, demonstrate the consistency, and establish the validity of the Turkish version of the Patient Version of the Tele-Pulmonary Rehabilitation Acceptance Scale (TPRAS-PV). **Material and Methods:** After obtaining the necessary permissions from the original scale, the scale was initially translated by a fluent Turkish-English translator and then independently back-translated into English. This second English version was then translated into Turkish, and the two Turkish versions were compared to address inconsistencies and potential misunderstandings in the meanings of the questions. The TPRAS-PV scale was translated into Turkish as "Pulmoner Telerehabilitasyon Kabullenme Skalası-Hasta Versiyonu" (PTKS-HV). Fifty-seven patients who were referred to the pulmonary rehabilitation (PR) unit have received the translated version. **Results:** In the statistical analyses, The Kaiser-Meyer-Olkin value was 0.816, and Barlett's test was significant ($p<0.001$). In factor analysis, 3 factors were identified: the first factor reflects the perceived usefulness of TR in PR, the second factor reflects the perceived ease of use of TR in PR, and the third factor reflects the behavioral intention to use TR in PR. The internal consistency of all subscales revealed satisfactory internal consistency (Cronbach's alpha ≥0.7). **Conclusion:** The PTKS-HV is a reliable and coherent instrument for assessing the acceptance of pulmonary TR among Turkish patients.

Keywords: Patient acceptance; pulmonary rehabilitation; telerehabilitation

ÖZET Amaç: Pulmoner telerehabilitasyon (TR) literatürde etkili ve yararlı bir yöntem olarak bildirilmiştir. Hastaların TR'yi kabullenme düzeyleri tedaviye uyum ve beklenen yararı önemli derecede etkilemektedir. Bu çalışmanın amacı, "Patient Version of the Tele-Pulmonary Rehabilitation Acceptance Scale"nın (TPRAS-PV) Türkçeye adaptasyonu ve validasyonudur. **Gereç ve Yöntemler:** Skalanın orijinal versiyonunu oluşturan yazarlardan gerekli izinler alındıktan sonra skala ilk önce ileri düzey İngilizce ve Türkçe bilen bir araştırmacı tarafından Türkçeye çevrildi, daha sonra tekrar İngilizceye çevrilerek ikinci İngilizce versiyon tekrar Türkçeye çevrildi. İki Türkçe versiyon karşılaştırılarak tutarsızlıklar ve anlam karmaşaları giderildikten sonra skalanın son hâli hazırlandı. TPRAS-PV skalası Türkçeye "Pulmoner Telerehabilitasyon Kabullenme Skalası-Hasta Versiyonu (PTKS-HV)" olarak çevrildi. Çeşitli hastalıklardan dolayı pulmoner rehabilitasyona (PR) yönlendirilen toplam 57 hasta yazılı onamları alındıktan sonra skalanın son versiyonu ile çalışmaya dâhil edildi. **Bulgular:** Yapılan istatistiksel analizler sonucunda Kaiser-Meyer-Olkin değeri 0,816 olarak bulundu. Barlett testi istatistiksel olarak anlamlı bulundu ($p<0,001$). Yapılan faktör analizi sonrasında 3 faktör belirlendi. Faktörlerden birincisi TR'nin PR'de algılanan kullanışlılık, ikincisi TR'nin PR'de algılanan kullanım kolaylığı, üçüncüsü ise PR'de TR kullanma niyeti idi. Alt ölçeklerin ve ölçeğin iç tutarlılık değerleri yeterli düzeyde bulundu (Cronbach alfa ≥0,7). **Sonuç:** PTKS-HV Türk hasta popülasyonunda PR için TR'nin hastalar tarafından kabullenmesini ölçmekte güvenilir ve geçerli bir skaladır.

Anahtar Kelimeler: Hasta kabullenmesi; pulmoner rehabilitasyon; telerehabilitasyon

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Correspondence: Mustafa Hüseyin TEMEL
Üsküdar State Hospital, Clinic of Physical Medicine and Rehabilitation, İstanbul, Türkiye
E-mail: mhuseyintemel@gmail.com

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Pulmonary rehabilitation (PR) is a holistic and interdisciplinary approach aimed at alleviating symptoms, improving functional capacity, and enhancing the health-related quality of life for individuals with long-term respiratory conditions.[1] This comprehensive approach involves exercise programs, self-care education, dietary adjustments, and emotional support to promote sustained compliance with beneficial health practices.[2] PR improves the physical and mental health of people with long-term respiratory conditions, addressing the initial difficulties and ongoing challenges, ultimately enhancing overall quality of life.[3]

Telerehabilitation (TR) provides rehabilitation services through information and communication technologies, including assessment, monitoring, intervention, supervision, education, consultation, and counseling.[4] Compared with conventional inpatient or face-to-face rehabilitation, TR offers cost savings for healthcare providers and patients while providing advantages to individuals in remote areas.[5]

TR in PR is a novel and promising field in healthcare practice. It is crucial to comprehensively understand the potential barriers to implementing TR in PR, particularly concerning the uncertainties and misperceptions held by prospective users of this technology.[6] Users' acceptance of TR has been suggested to play a significant role in determining its future use and adherence to telehealth services. Nonacceptance of potential TR users may result in low usage levels for the proposed telehealth program.[7] To comprehend the factors influencing potential users' acceptance of TR in PR, to enhance program usage, facilitate implementation, and bridge the gap between expectations of TR programs, Almojaibel et al. created a 13-item scale for assessing patient acceptance of TR. This study aimed to translate and validate the above-mentioned scale into Turkish.[6]

MATERIAL AND METHODS

The research was conducted in the Physical Medicine and Rehabilitation and Pulmonology Departments from January 8, 2024, to March 8, 2024, with ethical approval number 12 granted (date: February 7, 2024) by the Zeynep Kamil Women's and Children's Diseases Training and Research Hospital Clinical Research Ethics Committee. This study was conducted in accordance with the principles outlined in the Helsinki Declaration 2008. The study population comprised Turkish-speaking, literate individuals aged 18–65 who had been referred to PR. Patients who regularly attended PR sessions were excluded. All participants provided written informed consent. Patient demographics, including age, gender, education level, and body mass index, were documented.

The Patients' Version of the Tele-Pulmonary Rehabilitation Acceptance Scale (TPRAS-PV) comprises 13 questions that are answered using a 4-point Likert scale; scores range from 1 point meaning "definitely disagree" to 4 points indicating "definitely agree." The subscales included the perceived usefulness of TR (7 questions), perceived ease of use of TR (4 questions), and behavioral intention to use TR (2 questions). Higher scores indicate greater acceptance of TR in PR.[6]

The required approvals from the original scale developer were secured before starting the study. The scale was first translated by a proficient Turkish-English translator and then independently back-translated into English. This second English version was then translated into Turkish, and the two Turkish versions were compared to address inconsistencies and potential misunderstandings in the questions' meanings.[8] The research team reviewed these issues and established a final version, "Pulmoner Telerehabilitasyon Kabullenme Skalası-Hasta Versiyonu" (PTKS-HV). Patients also provided feedback on the scale's construction, usefulness, and scope using a 100-mm visual analog scale for evaluation.[9]

Patient characteristics were evaluated using basic descriptive tests. The identified factors' construct validity, factor structure, and internal consistency underwent analysis. The suitability of the factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's sphericity test. Construct validity was appraised via principal component analysis with orthogonal rotations (varimax), where factors with eigenvalues exceeding 1.0 were extracted.[10] Subsequently, a correlation matrix was generated using varimax ro-

tation with Kaiser normalization, considering only factor loadings greater than 0.40 on one factor or interpreting the highest loading if an item was loaded on multiple factors.[11] Internal consistency for subscales was determined using Cronbach's alpha values ≥0.7 to be satisfactory at a significance level set as $p<0.05$. SPSS version 27.0 (IBM, Armonk, NY, USA) software was used for statistical analysis.

RESULTS

A total of 57 participants were included. Table 1 summarizes the patient characteristics. The KMO value was found to be 0.816, and Bartlett's test yielded a significant result ($p<0.001$), indicating that our sample size of 57 patients was sufficient for conducting factor analyses. Table 2 summarizes the eigenvalues and percentage variance explained by each factor extracted from the analyses, which resulted in three factors being identified. The first factor reflects the perceived usefulness of TR in PR, the second factor reflects the perceived ease of use of TR in PR, and the third factor reflects the behavioral intention to use TR in PR. Internal consistency analysis revealed satisfactory reliability for all subscales (Cronbach's alpha ≥0.7.

Table 3 presents an overview of patients' feedback on the scale's effectiveness and structure.

TABLE 1: Demographic and disease-related data of the participants.

	Minimum	Maximum	Mean	SD
Age	21.00	86.00	58.5965	16.38473
Body mass index	16.98	57.16	29.1883	7.27059
Duration of follow-up	1.00	30.00	7.2982	7.96413
Marital status	n		%	
Married	44		77.2	
Single	7		12.3	
Widow	6		10.5	
Education				
No formal education	16		28.1	
Primary school	22		38.6	
Middle school	2		3.5	
High school	7		12.3	
University	9		15.8	
Doctorate-Master's degree	1		1.8	
Current pulmonary disease				
Asthma	39		68.4	
Chronic obstructive pulmonary disease	15		26.3	
Post-COVID dyspnea	1		1.8	
Pneumonia	1		1.8	
Post-radiotherapy dyspnea	1		1.8	
Current smoker				
Yes	5		8.8	
No	52		91.2	

SD: Standard deviation; n: Total number of participants.

DISCUSSION

This research translated and modified the TPRAS-PV for Turkish use while also validating the consistency and accuracy of the translated questionnaire. The final version included all 13 questions. Psychometric assessments have shown that the PTKS-HV is a reliable and valid instrument, well-suited for identifying TR acceptance in PR with patients referred to TR.

Validating the translation of research scales is essential to guaranteeing the precision, consistency, and cultural applicability of these instruments. This process upholds the integrity of cross-cultural research, facilitating accurate measurement and meaningful comparisons across diverse linguistic and cultural settings.[12] The validation of TPRAS-PV has facilitated the cultural adaptation of an international research instrument in a significant domain, such as PR, which can lay the groundwork for future investigations in this field.

TR is becoming increasingly popular as a substitute for traditional in-person rehabilitation methods, with the aim of reducing expenses, improving accessibility, and achieving better results by using realistic interventions.[13] Tchero et al. found that TR could serve as an alternative for individuals recovering from stroke, particularly in regions distant from healthcare facilities or those lacking adequate infrastructure.[14] Georgeadis et al. observed a strong interest in TR among patients with speech-language pathology following stroke and traumatic brain injury.[15] Cherney and van Vuuren reported that TR demonstrated validity and reliability for conditions such as Alzheimer's disease, dysarthria, and apraxia of speech.[16] In addition, Seidman et al. noted the willingness of most patients attending a metropolitan PR unit to participate in pulmonary TR programs.[17] The

TABLE 2: Maximum likelihood factor analyses, percentage of variance and eigenvalues for factors.

	Factor 1	Factor 2	Factor 3
TPRAS-PV Item			
Telerehabilitation will improve my access to rehabilitation programs	0.567		
Telerehabilitation will improve my attendance in the rehabilitation program	0.769		
Telerehabilitation will eliminate transportation difficulties in getting to the rehabilitation center	0.636		
Telerehabilitation could help me to receive care more quickly at home	0.721		
Telerehabilitation will be useful in the rehabilitation program	0.667		
Telerehabilitation will improve my communication with the health-care provider	0.614		
Telerehabilitation will improve my commitment to the rehabilitation program	0.789		
Learning to operate the telerehabilitation equipment will be easy for me		0.681	
Telerehabilitation will be easy to use		0.613	
Receiving pulmonary rehabilitation services at home by using telerehabilitation will be more convenient		0.737	
Education sessions will be easier when using telerehabilitation		0.779	
I will plan to use telerehabilitation to receive pulmonary rehabilitation services			0.731
I will use telerehabilitation to receive pulmonary rehabilitation services as often as recommended by my provider			0.734
Extraction sums of squared loadings			
Eigenvalue	9.069	1.616	1.06
Variance explained %	60.45	10.77	7.07
Rotation sums of squared loadings			
Eigenvalue	4.28	4.01	3.44
Variance explained %	28.57	26.78	22.94
Reliability (Cronbach's alpha)	0.918	0.882	0.971

TPRAS-PV: Tele-Pulmonary Rehabilitation Acceptance Scale-Patient Version.

TABLE 3: Participants' opinions about the questionnaire.

	VAS scores $\bar{X}$±SD
Is this questionnaire useful to assess tele-pulmonary rehabilitation acceptance?	7.36±2.04
Do you think that this questionnaire assesses your tele-pulmonary rehabilitation acceptance?	7.26±2.22
Is the length of the questionnaire appropriate?	7.84±2.22
Are the questions clearly understandable?	8.08±1.93
Is this questionnaire well-organized?	7.89±2.39
What is your opinion about the readability of the questionnaire?	7.92±2.22
Is it easy to fill-in this questionnaire?	6.38±3.28
What do you think about the layout of the questionnaire?	7.87±2

VAS: Visual analog scale; SD: Standard deviation.

widespread adoption of TR and its influence across various domains underscores the need for additional research to explore its implications and establish essential components, such as selecting suitable patients for its use.

Acceptance of TR plays a crucial role in enhancing a client's ability to receive care, promoting ongoing continuity of treatment, and enabling individuals to actively manage their healthcare needs and interventions.[18] TR effectiveness is greatly influenced by the willingness and engagement of patients in using these treatments. Nonetheless, previous studies have indicated a significant number of patients dropping out or not using the treatment, as well as substantial differences in the frequency and duration of interventions.[19,20] Prioritizing the identification of patients highly receptive to TR in PR may enhance patient benefits and optimize the utilization of healthcare resources and staff. Hence, the TPRAS-PV should be adapted to various languages.

Türkiye has a restricted number of PR facilities, despite the increasing burden posed by patients with chronic respiratory issues.[21] Pulmonary diseases are also a significant concern in Türkiye, with various studies revealing higher prevalence rates compared to other countries. For instance, Ucan et al. reported an increased incidence of pulmonary alveolar microlithiasis in Türkiye.[22] Gunen et al. observed a higher prevalence of chronic obstructive pulmonary

disease in Malatya, while Öngen et al. highlighted the elevated burden of pulmonary tuberculosis among prisoners in the country.[23,24] Additionally, Reynolds et al.'s research indicated that farmers in Türkiye face heightened risks of pulmonary diseases due to factors such as exposure to environmental agents and long-term work experience within specific industries.[25] Given the significant impact of pulmonary disease in Türkiye and the scarcity of PR facilities, the use of TR has the potential to gain prominence. It is anticipated that the established and validated scale will play a crucial role in identifying suitable candidates for this approach, benefiting Turkish professionals, including doctors and government officials interested in this topic.

CONCLUSION

The PTKS-HV is a reliable and coherent instrument for assessing the acceptance of pulmonary TR among Turkish patients. Given the increasing burden of chronic respiratory diseases and the limited number of PR facilities in Türkiye, adopting TR is a crucial strategy. This validated scale will enhance the selection of suitable candidates for pulmonary TR and improve treatment accessibility and outcomes. Furthermore, it will play a significant role in shaping health policies and offering direction for future research, benefiting Turkish healthcare professionals and policymakers striving to address the growing need for practical, accessible rehabilitation solutions.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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