

Clinical Pharmacy Department¹, Faculty of Pharmacy; Department of Public Health², Faculty of Medicine, Marmara University, Istanbul; Clinical Pharmacy Department³, Faculty of Pharmacy, Hacettepe University, Ankara, Turkey

Translation and psychometric evaluation of the Turkish version of the pharmacy students' perceptions of preparedness to provide pharmaceutical care scale

B. OKUYAN¹, M. SANCAR¹, P. AY², K. DEMIRKAN³, S. APIKOGLU-RABUS¹, F. VEHBİ İZZETTİN¹

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Betul Okuyan, Faculty of Pharmacy, Clinical Pharmacy Department, Marmara University, Tibbiye Cd No. 49, Haydarpaşa, Istanbul 34668, Turkey
betulokuyan@yahoo.com

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The aim of the study is to conduct the psychometric evaluation of the Turkish version of the Pharmacy Students' Perceptions of Preparedness to Provide Pharmaceutical Care (PREP) scale. The present study was conducted at three faculties of pharmacy among fifth-year students during a three-month period in 2015. After the translation process, the Turkish version was developed. Psychometric evaluation consisted of the calculation of inter-rater and test-retest reliability and factor analysis. The mean age of 184 students (71.2% of female) was 23.74±1.07. The mean score of the Pharmacy Students' PREP scale was 4.54±1.00 and the Cronbach's alpha was 0.971. Inter-rater and test-retest reliability and factor analysis were also in concordance with the literature. In the present study, the Turkish version of Pharmacy Students' Perceptions of Preparedness to Provide Pharmaceutical Care Scale has been determined to be a reliable and validated tool to assess students' perceptions of preparedness to provide pharmaceutical care.

1. Introduction

Pharmacy curricula are changing from product-oriented to patient-oriented pharmaceutical services as reported by American Association of Colleges of Pharmacy (2004). The Pharmaceutical Care Network Europe (PCNE) defines pharmaceutical care as 'the pharmacist's contribution to the care of individuals in order to optimize medicine's use and improve health outcomes' (Alle-mann et al. 2014). The general quality of pharmaceutical care can be increased by individualization of the services. In the process of pharmaceutical care, pharmacists undertake an evaluation of risks and benefits in medication utilization by taking professional responsibility for achieving treatment outcomes that could increase patients' quality of life (Hepler and Strand 1990).

In previous studies (Ried et al. 2002; Scott et al. 2010a) it was determined that pharmacy students felt more ready to perform patient oriented pharmacy services as the students' study year increased. When compared to pharmacy students in the initial years of pharmacy education, final year pharmacy students displayed better preparedness in technical, communication and administrative domains of preparedness to provide pharmaceutical care (Ried et al. 2002; Scott et al. 2010a)

The Accreditation Council for Pharmaceutical Education (ACPE) (2016) emphasizes the importance in systematically evaluating bachelor's pharmacy education with reliability and safety scales, and also suggests the executive board of pharmacy faculties utilize the results of these scales to assess education and professional competence of the students. In Turkey, the National Accreditation Board for Pharmacy Education has been accrediting the faculties of pharmacy since 2014. The present validation study would contribute to systematic measurement and evaluation of pharmacy programs.

The Perceptions of Preparedness to Provide Pharmaceutical Care (PREP) Scale was developed by Ried et al (2002), and consists of 33 items to evaluate pharmacy students' perceptions of preparedness to provide pharmaceutical care. This scale has a total of five domains, including the technical aspect (14 items), psychology

aspect (9 items), communication aspect (4 items), administrative aspect (4 items) and research aspect (2 items).

There is no validated and reliable Turkish scale in the literature to assess patient oriented pharmacy education. The aim of the study is to conduct psychometric evaluation of the Turkish Version of the PREP Scale. Determination of pharmacy students' perceptions regarding preparedness to provide pharmaceutical care would be beneficial for the institutional evaluation of pharmacy faculties and development of the pharmacy profession in Turkey.

2. Investigations and results

The present study has been conducted on a total of 184 fifth-year pharmacy students in three different pharmacy schools located in three regions of Turkey. The mean age of the participants was 23.74±1.07 and 71.2% of them were female. The future professional plan of almost half of the participants (n=86, 46.74%) was working as a community pharmacist. The sociodemographic characteristics of pharmacy students (n=184) are presented in Table 1. There was no statistically significant difference between the test and retest scores (p>0.05) (data not shown). Test-retest reliability of the scale (n=30) was high for the total score (r=0.727; p<0.001). The mean score of the Pharmacy Students' Perceptions of Preparedness to Provide Pharmaceutical Care Scale was 4.54±1.00 and the Cronbach's alpha was 0.971. This result presented a high inter-reliability of this scale.

The Kaiser Meyer Olkin (KMO) measure of sampling adequacy was 0.95 and in the result of Bartlett's test of sphericity, approximate Chi-Square was 4973.842 (p<0.001).

A total of five domains have been determined by factor analysis for the Turkish version of the PREP scale in the present study (Table 2). According to results of factor analysis in the present study, the 15th, 16th and 17th items, which were involved in psychological aspects in the original scale, were listed under the research domain. However, the domains of other items were in concordance with the original scale.

Internal reliability of the total score and domains' scores of the scale has been presented with high Cronbach alpha values (Table 3).

Table 1: Sociodemographic characteristics of the participants (n=184)

Age, years (Mean±SD) (range)	23.74±1.07 (22-28)
Gender	n (%)
Male	131 (71.2%)
Female	53 (28.8%)
Faculty of Pharmacy	n (%)
Marmara University (Istanbul)	79 (42.9%)
Hacettepe University (Ankara)	70 (40.8%)
Inonu University (Malatya)	35 (16.3%)
Future Professional Plans*	n
Hospital Pharmacy	52
Community Pharmacy	86
Industrial Pharmacy	26
Not sure	28
Others	21

*more than one choice could be selected; n: number of participants

Besides, the statistically high correlations between each domain and total scores of the scale have indicated a strong association (Table 4). There was no statistical correlation between age and the total and subscales scores of the scale ($p>0.05$; data not shown). The scores of total scale and subscales did not statistically differ between genders ($p>0.05$; data not shown).

3. Discussion

A debate has been ongoing regarding how pharmacy students perceived their preparedness to perform patient oriented pharmaceutical services after their undergraduate education, including intensive theoretical and practical courses. In most countries, including Turkey, pharmacy education has been shifting from product-oriented focus to patient care. Despite this change, it is well known that most students do not feel ready to perform patient oriented services after their graduation. Besides, valid tools to evaluate pharmacy students' perception regarding performing patient oriented services are scarce. Ried et al. (2002) developed a scale to evaluate pharmacy students' perceptions

Table 2: Factor analysis of items

Rotated Component Matrix^a

	Technical aspects	Psychological aspects	Communication aspects	Administrative aspects	Research aspects
1. Recommend appropriate drug therapy	0.813				
2. Evaluate medications and/or laboratory tests	0.754				
3. Integrate knowledge for pharmacotherapy	0.723				
4. Determine the appropriate drug delivery system	0.722				
5. Recommend medication doses and dosage schedules	0.703				
6. Identify/collect information to resolve a drug therapy problem	0.691				
7. Evaluate laboratory test results for a specific patient	0.691				
8. Calculate and evaluate pharmacokinetic properties	0.682				
9. Evaluate information from patient's history and assessment	0.668				
10. Make reasonable conclusions when data is incomplete	0.638				
11. Provide counseling to patients	0.612				
12. Devise methods to seek optimal patient compliance	0.610				
13. Monitor therapeutic plan for a patient	0.599				
14. Document information on drug-related problems	0.598				
18. Impact of values in professional interactions		0.774			
19. Apply ethical theories to professional decisions		0.721			
20. Understand social and cultural impact on health environment		0.713			
21. Understand practice related to changing societal expectations		0.682			
22. Appropriate interpersonal behaviors during patient interactions		0.679			
23. Contribute opinions/insights to healthcare team		0.510			
24. Communicate medical records information to health professionals			0.762		
25. Communicate medical records information to patient			0.741		
26. Collect information to respond to a patient DI request			0.716		
27. Respond to an information request from a patient			0.506		
28. Evaluate, select, and purchase pharmaceuticals				0.779	
29. Develop and implement a pharmacy inventory control system				0.773	
30. Manage fiscal and human resources				0.683	
31. Develop and implement drug use evaluations and formulary				0.582	
32. Describe the research process					0.816
33. Provide a critical review of a publication					0.662
15. Gather information to resolve a problem*					0.656
16. Synthesize information and decide a course of action for a problem*					0.599
17. Make decisions integrating social, cultural, and ethical issues*					0.545

^a Items which involved in psychological aspect in original scale were listed under research domain as a result of factor analysis in the present study.

Table 3: Internal reliability of the total score and domains' score of the scale

	Mean±SD	Median	25 th -75 th Percentiles	Cronbach's alpha
<i>Total</i>	4.54±1.00	4.62	3.95-5.33	0.971
<i>Technical aspects</i>	4.33±1.08	4.43	3.78-5.07	0.952
<i>Psychological aspects</i>	5.17±1.07	5.33	4.50-5.83	0.904
<i>Communication aspects</i>	5.18±1.17	5.38	4.50-6.00	0.897
<i>Administrative aspects</i>	4.00±1.32	4.00	3.00-5.00	0.898
<i>Research aspects</i>	4.50±1.24	4.60	3.60-5.40	0.902

Table 4: Spearman's correlation coefficients among domains of the scale

Spearman's rho

	Technical aspects	Psychosocial aspects	Communication aspects	Administrative aspects	Research aspects
<i>Technical aspects</i>					
<i>Psychological aspects</i>	0.644***				
<i>Communication aspects</i>	0.687***	0.717***			
<i>Administrative aspects</i>	0.686***	0.572***	0.585***		
<i>Research aspects</i>	0.689***	0.691***	0.695***	0.662***	
<i>Total</i>	0.920***	0.813***	0.821***	0.817***	0.850***

***All coefficients are statistically significant (p<0.001).

of preparedness to provide pharmaceutical care in the USA, where clinical pharmacy has been involved in the pharmacy program for many years. Ried et al. (2002) first developed a scale consisting of 41 items, and after performing a factor analysis the original scale was reduced to 33 items. Scott et al. (2010a) also assessed students' perceptions regarding their preparedness to perform advanced pharmacy services by using the scale developed by Ried et al. (2002). In concordance with Ried et al. (2002), the same results have been determined after performing factor analysis for 33 items. Different than Ried et al. (2002), Scott et al. (2010a) evaluated 2 items, which were previously determined under research aspects as a multiple factor (Scott et al. 2010a). In the present study, a total of 33 items were assessed by scoring on a Likert scale ranging from 1 to 7. Like previous studies (Ried et al. 2002; Scott et al. 2010a), it was found that the Turkish version of the PREP scale consisted of five domains. Different from other studies (Ried et al. 2002; Scott et al. 2010a), three items (15th, 16th, and 17th) previously listed under the psychosocial domain, were listed under the research domain while the other items were listed under the same domains as reported in the previous studies (Ried et al. 2002; Scott et al. 2010a). Except from this difference, which would be attributed to the translation and cultural adaptation process, the Turkish version of the PREP scale had been determined to be a reliable and validated scale to assess students' perceptions of preparedness to provide pharmaceutical care with high Cronbach's alpha and correlation scores which were similar to those reported previously (Ried et al. 2002; Scott et al. 2010a).

In Turkey, patient-oriented pharmacy education first developed in the 1990s. However, the acceptance and implementation of this educational model across the country covers approximately the last 10-year period. The National Accreditation Board for Pharmacy Education started to accredit the faculties of pharmacy in 2014 in Turkey. This is one of the most important and recent advancements in pharmacy education in Turkey. This board emphasized certain

points, especially that theoretical and practical patient-oriented courses should be included in the bachelor of pharmacy education, and also all the courses in the programs should be self-evaluated.

Also, another accreditation board for pharmacy education and guidelines regarding the pharmacy profession indicated the importance of self-evaluation (Austin and Gregory 2007). It is well known that problem-based learning is also important for improving pharmacy students' perceptions of their preparedness to perform patient oriented pharmaceutical services (Hogan and Lundquist 2006).

In Turkey, the pharmacy education program is still developing and it is important to assess the influence of these concepts on the pharmacy education program. Thus, advancement in pharmacy education could be accelerated. Indeed, the National Pharmaceutical Core Education has been completed in the last months of 2015, and asked all faculties of pharmacy in Turkey to revise their curricula according to this core education program. In view of these developments, the validated Turkish version of the PREP scale would be a useful tool to evaluate pharmacy education, and also it would be used by the National Accreditation Board for Pharmacy Education and the executive board of each faculty.

According the results of the study conducted by Scott et al. (2010b) in North Dakota to evaluate pharmacists' perceptions of preparedness to provide pharmaceutical care, it was determined that the PREP scale could be applied not only to pharmacy students, but also used to assess pharmacists' perceptions of preparedness to provide pharmaceutical care.

The present study was conducted in three faculties of pharmacy placed in different regions in Turkey. The purpose of selecting these faculties was that theoretical and practical patient-oriented courses, including clinical pharmacy and pharmaceutical care, have been implemented for many years in these faculties by clinical pharmacy professors. The main purpose of this study was to conduct a psychometric evaluation of the Turkish Version of the PREP scale; therefore, comparison of faculties has not been done. When evaluating medians of each item, out of 33 items, the median score was 4 for 16 items and 5 for 13 items. Considering scoring out of a maximum of 7, the pharmacy students' perception regarding performing patient-oriented services was moderate. In concordance with the present study, the previous studies also declared the pharmacy students' perception regarding performing patient oriented services as moderate (Ried et al. 2002; Scott et al. 2010a).

In previous studies, preparedness was found to be the highest for the psychosocial aspect; on the other hand, the lowest scores were obtained in technical aspects (Scott et al. 2010a). Within the psychological area, the three highest rated items were 'impact of values in professional interactions', followed by 'apply ethical theories to professional interactions' and 'gather information to resolve a problem' (Scott et al. 2010a). In the present study, the highest scores were obtained in three items (19th, 21st, and 25th item; respectively) as follows: 'apply ethical theories to professional decisions', 'understand practice related to changing societal expectations', and 'communicate medical record information to patient'.

In previous studies, the lowest scores were respectively obtained in three items: 'manage fiscal and human resources', 'develop and implement a pharmacy inventory control system' and 'develop and implement drug use evaluations and formulary' (Scott et al. 2010a). In the present study, the lowest scores were obtained in three items (5th, 8th, and 30th item; respectively), namely: 'recommend medication doses and dosage schedules', 'calculate and evaluate pharmacokinetic properties' and 'manage fiscal and human resources'. When compared with the study conducted by Scott et al. (2010a), in the present study, common items were attributed to ethical aspects in the highest scores and financial aspects in the lowest scores.

In a study which aimed to elucidate pharmacy students' points of view on pharmaceutical care, it was found that the most frequently mentioned barriers to perform pharmaceutical care were financial, working time, organizational and technical problems (Perraudin et al. 2011). Although the methodology of the present study was

not similar to the study conducted by Perraudin et al. (2011), it was obvious that most of pharmacy students had similar concerns regarding preparedness for professional life.

The present study was conducted only on fifth-year pharmacy students, unlike the previous studies (Ried et al. 2002; Scott et al. 2010a). In the previous studies, it was found that graduated pharmacy students perceived more preparedness towards patient-oriented pharmacy services than the pharmacy students in their initial degrees (Ried et al. 2002; Scott et al. 2010a).

Pharmacy education in Turkey lasts a total of five years. In the first three years, pharmacy education encompasses courses of basic pharmaceutical sciences. Theoretical and practical courses regarding patient-oriented services take place in the last years of pharmacy education in Turkey. This study was conducted on fifth-year pharmacy students, and the purpose of selecting this population was that it would be more appropriate for this psychometric evaluation study because fifth-year students would be more familiar with items regarding patient-oriented services.

After psychometric evaluation, the Turkish version of the PREP was found as a reliable and validated tool, as similar results with those of the previous studies (Ried et al. 2002; Scott et al. 2010a) were obtained in the present study. When considering recommendations of the World Health Organization (WHO) and the International Pharmaceutical Federation (FIP) about improvement of patient-oriented services such as clinical pharmacy and pharmaceutical care in pharmacy education and practices (Wiedenmayer et al. 2006), the Turkish version of the PREP scale would be a reliable tool in determining both pharmacy students' and pharmacists' perceptions of preparedness towards these concepts, which is still an ongoing progress in Turkey.

4. Experimental

4.1. Study design

This study was conducted during a three-month period in 2015 among students of three pharmacy faculties located in three different geographic regions of Turkey. These faculties were Hacettepe University Faculty of Pharmacy (Ankara), Inonu University Faculty of Pharmacy (Malatya) and Marmara University Faculty of Pharmacy (Istanbul). Fifth-year pharmacy students were eligible to be included in the study if they were over 18 years old and agreed to participate in the present study after being informed regarding its aims and methods. Demographic characteristics including age, gender and the future professional plans of the students were also collected.

The original PREP scale addressed various aspects of pharmaceutical care (Ried et al. 2002). Recently Scott et al. (2010a) slightly modified the scale by excluding sociodemographic items. In the present study, a total of 33 pharmaceutical care items were evaluated. The permission for using this scale was taken from L. Douglas Ried. Each item was scored on a Likert scale ranging from 1 to 7.

The general sample size needed to perform the factor analysis was calculated as five- to ten fold of the total items on the scale. In the present study, as the PREP scale consists of 33 items, a sample size of at least 165 participants, which is fivefold of a total of 33 items, was found sufficient to perform the psychometric evaluation of the Turkish version of the PREP scale (Streiner and Norman 2002). All study participants were fully informed and data was collected only for those who provided their consent. Permission was taken from the deans of each faculty. Ethical approval has been obtained from the Ethics Committee of Marmara University Institute of Health Sciences.

4.2. Translation process

The original English scale was translated to Turkish by two fluent English speakers who are native Turkish clinical pharmacists. These two Turkish forms were studied on and a reconciled initial Turkish version was developed. This reconciled initial Turkish version was translated back to English by native English speakers who could fluently speak and write Turkish. These translators were not informed about the aim and method of the present study. After evaluation of the translation forms, the final Turkish version of the scale was developed. The language and conceptual analysis of this version were evaluated. The pilot test has been conducted on 20 pharmacy students.

4.3. Statistical analysis

Categorical variables were expressed as numbers (n) and percentages (%), while continuous variables were expressed as mean [standard deviation (SD)] and median [25th-75th percentiles].

Test-retest reliability was evaluated at baseline and after three weeks in 30 fifth-year pharmacy students.

Test-retest reliability was evaluated by Spearman's correlation between scores of the scale and subscales at baseline and after three weeks. The difference between scores of the scale and subscales at baseline and after three weeks was also assessed by the Wilcoxon test since the data weren't normally distributed.

Psychometric evaluation consisted of reliability analysis by calculation of inter consistency via Cronbach's alpha for the total scale and each subscale and constructing validity by factor analysis. For factor analysis, principal component extraction and varimax rotation were used. The correlation between two continuous variables was analyzed by the Spearman's correlation. Continuous variables between two groups have been evaluated by the Mann-Whitney U test. $p < 0.05$ was determined as the level of statistical significance.

Conflict of interest: None declared.

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