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Reliability and Sensitivity of a New Simple Screening Test (TUPAST) in Psoriatic Arthritis Including Axial Involvement: Methodological Study

Yeni, Basit Tarama Testinin (TUPAST) Aksiyal Tutulumu da İçeren Psöriyatik Artrit Hastalarında Güvenilirlik ve Duyarlılığı: Metodolojik Çalışma

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ABSTRACT Objective: Early detection of psoriatic arthritis (PsA) can prevent destruction and functional disabilities. Dermatologists play an important role in the early diagnosis and treatment of PsA. The aim of the study was to develop a practical questionnaire that does not take long time for early diagnosis of PsA and for not to overlook axial involvement. **Material and Methods:** This was a prospective study including 200 psoriasis patients. Turkish Psoriatic Arthritis Screening Tool (TUPAST) questions were designed in a simple and plain language that the patients could easily understand. Patients were asked to answer these 6 questions and the well-known questionnaire Toronto Psoriatic Arthritis Screening 2 (ToPAS 2) synchronously. **Results:** ROC analysis was performed to determine the cut-off value of TUPAST, and the cut-off value was determined as 3. The sensitivity of the cut-off value was calculated as 54.32% and the specificity as 90.68%. The cut-off value obtained for ToPAS 2 was 8 and its sensitivity was 79%, and specificity was 55% in our patient population. There was a significant difference between two tests in terms of time spent for answering questions (TUPAST-0.5 minute, ToPAS 2-3.6 minute) ($p<0.05$). **Conclusion:** PsA screening by dermatologist can be the first step in diagnosis of joint involvement in psoriasis. Due to the heavy patient traffic of dermatology outpatient clinics, we need tests that do not take much time. TUPAST is a simple and time saving screening test that takes only 30 seconds to answer and can be used in prediagnosis of PsA.

Keywords: Psoriasis; psoriatic arthritis; screening test; Toronto Psoriatic Arthritis Screening 2; Turkish Psoriatic Arthritis Screening Tool

ÖZET Amaç: Psöriyatik artritin (PsA) erken tespiti, eklem destrüksiyonu ve işlev kaybını önleyebilir. Dermatologlar, PsA'nın erken tanı ve tedavisinde önemli bir rol oynamaktadır. Çalışmamızın amacı, PsA'nın erken tanısı için uzun zaman almayan ve aksiyel tutulumu gözden kaçırmayan pratik bir anket geliştirmektir. **Gereç ve Yöntemler:** Çalışmamız, 200 psöriyazis hastasını kapsayan prospektif bir çalışmaydı. Türk Psoriatik Artrit Tarama Anketi [Turkish Psoriatic Arthritis Screening Tool (TUPAST)] soruları hastaların anlayabileceği sade bir dilde hazırlandı. Hastalardan bu 6 soru ve Toronto Psoriatik Artrit Tarama 2 [Toronto Psoriatic Arthritis Screening 2 (ToPAS 2)] anketini eş zamanlı olarak cevaplamaları istendi. **Bulgular:** TUPAST'ın eşik değerini belirlemek için ROC analizi yapıldı ve eşik değeri 3 olarak belirlendi. Eşik değerin duyarlılığı %54,32, özgüllüğü %90,68 olarak hesaplandı. ToPAS 2 için elde edilen eşik değer 8 olup duyarlılığı %79, özgüllüğü ise hasta popülasyonumuzda %55 olarak bulundu. Soruları cevaplamak için harcanan süre açısından iki test arasında anlamlı fark vardı (TUPAST-0,5 dk, ToPAS 2-3,6 dk) ($p<0,05$). **Sonuç:** Dermatolog tarafından yapılan PsA taraması, sedef hastalığının eklem tutulumunun tanısında ilk adım olabilir. Dermatoloji polikliniklerinin yoğun hasta trafiğinden dolayı fazla zaman almayan testlere ihtiyaç duyulmaktadır. TUPAST, PsA ön tanısında kullanılabilen, cevaplanması sadece 30 sn süren, basit ve zaman kazandıran bir tarama testidir.

Anahtar Kelimeler: Psöriyazis; psöriyatik artrit; tarama testi; Toronto Psoriatik Artrit Tarama 2; Türk Psoriatik Artrit Tarama Anketi

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Psoriasis is an immune-mediated chronic inflammatory disease that primarily affects the skin and joints, sharing common features with immune-mediated inflammatory diseases. Early treatment is crucial for managing joint damage in arthritis-related conditions, especially within the first two years of the disease.[1]

Early identification of peripheral joint and axial involvement in psoriatic arthritis (PsA) patients can prevent destruction and functional disabilities. The frequency of inflammatory arthritis among individuals with psoriasis ranges from 6% to 42%.[2] According to a systematic review and meta-analysis, the collective prevalence of undiagnosed PsA within individuals with psoriasis was estimated at 15.5%.[3] Axial disease occurs in 25-70% of patients with PsA, and some patients may develop axial joint involvement.[4,5]

The validation of the Toronto Psoriatic Arthritis Screening 2 (ToPAS 2) tool extended to both the general population and those specifically with psoriasis.[6] Similarly, the Psoriasis Epidemiology Screening Tool (PEST), Psoriatic Arthritis Screening and Evaluation (PASE), and Early Psoriatic Arthritis Screening Questionnaire (EARP) share a comparable questionnaire framework and have undergone validation for individuals diagnosed with psoriasis.[7-9]

Dermatologists play a significant role in promptly diagnosing and treating PsA through the screening of psoriasis patients. It's crucial for dermatologists to be adept at recognizing signs of PsA, including those linked to axial involvement. ToPAS was updated to ToPAS 2 with the addition of new questions due to its limitations in assessing axial involvement.[10] However, it was predicted that ToPAS 2 might still be insufficient for axial involvement since a spine domain was not included in the total score. The objective of this study was to develop a practical questionnaire that does not take much time for the early diagnosis of PsA and to avoid overlooking axial involvement. Additionally, the literal translation of a questionnaire can lead to misunderstandings due to cultural differences among countries. Instead of adapting and validating existing PsA screening tools in English, we aimed to create a brief, time-saving questionnaire in the Turkish language.

MATERIAL AND METHODS

This prospective study included 200 patients diagnosed with psoriasis. Approval for the study was obtained from the institutional ethical committee of Bezmialem Vakif University (date: July 30, 2019, no: 15/291). Clinical Trials ID is NCT04277832. All patients provided informed consent, and the study was conducted following the principles outlined in the Declaration of Helsinki.

Patients with psoriasis between 18-75 years of age, of both sexes, and who can read and understand the Turkish language were included in the study.

The diagnosis of cutaneous psoriasis was made by two experienced dermatologists, and the diagnosis of PsA was made in the Rheumatology Unit of the Physical Therapy and Rehabilitation Department by an experienced specialist. The diagnosis of PsA adhered to the Classification Criteria for Psoriatic Arthritis (CASPAR criteria). Joint radiographs were assessed, and laboratory investigations included the examination of CRP levels and the presence of HLA B27 positivity.

Data such as gender, age, body mass index, disease duration, family history, drug history, psoriasis types, and specific involvement areas were also recorded. Psoriasis Area and Severity Index (PASI) scoring of all patients was performed by an experienced dermatologist.

QUESTIONNAIRE

Twenty-nine questions were collected from the literature related to PsA and from the opinions of experienced dermatologists and rheumatologists. Five dermatologists and five physical therapy and rehabilitation specialists with experience in psoriasis and PsA reduced the number of questions to 12 using the Delphi method. Then, similar or confusing questions were eliminated, reducing the scale to six questions. The questions were designed in simple and plain language for easy understanding by patients and asked for brief yes or no answers. Patients were asked to answer these six questions and the well-known

ToPAS 2 questionnaire simultaneously. ToPAS 2 includes 13 questions about skin, nail, peripheral, and axial joint involvement. However, axial involvement questions were not included in the scoring. This test was chosen for comparison because of its high specificity and sensitivity, and it was validated in the Turkish population by Duruöz et al.[10]

Questions

1. Have you ever had sausage-like swelling in your fingers?

2. Do you have low back pain for more than 3 months?

3. Do you have pain in your heels?

4. Do you have anterior chest pain?

5. Does anyone in your family have PsA?

6. Do you have migratory joint pain?

STATISTICS

The Kuder-Richardson-20 test was applied to evaluate internal reliability. The data distribution underwent analysis using the Shapiro-Wilk test. Descriptive statistics are given as the mean±standard deviation, median (range), and n (%). The t-test was employed for comparing two independent groups with a normal distribution, while the Mann-Whitney U test was utilized for comparing two independent groups without a normal distribution. The one-way analysis of variance (ANOVA) test was applied in comparisons of three or more independent groups with normal distribution. After the ANOVA test, the Bonferroni test was used as a post-hoc test. Both the Pearson chi-square and Fisher Freeman Halton tests were employed to assess disparities between categorical variables. All analyses were performed using IBM SPSS Statistics for Windows (version 26.0; IBM Corp., Armonk, NY, USA). In all analyses, $p<0.05$ was considered statistically significant.

RESULTS

A total of 200 patients, comprising 99 women (49.5%) and 101 men (50.5%), were included in the study. The mean age of the patients was 46.8 (±13.1) years. The average disease duration was 19.1 years, and the mean PASI score was 2.8 (Table 1). Eighty patients (40%) had a family history of psoriasis. Nail involvement was seen in 71 patients (35.5%) and scalp involvement was observed in 78 patients (39%). Details of the patients' demographic and clinical characteristics are shown in Table 1.

TABLE 1: Demographic and clinical characteristics of patients.

	n=200
Sex	
Female	50.5% (n=101)
Male	49.5% (n=99)
Age (years), $\bar{X}$±SD	46.8±13.1
Duration disease (years), $\bar{X}$±SD	19.1±12.6
Weight (kg), $\bar{X}$±SD	80.9±17.1
Height (cm), $\bar{X}$±SD	1.6±0.0
BMI (kg/m^2), $\bar{X}$±SD	28.4±5.8
Presence of family history of psoriasis, n (%)	80 (40)
PASI $\bar{X}$±SD	2.8±7.5
Nail involvement, n (%)	71 (35.5)
Scalp involvement, n (%)	78 (39)
Inverse involvement, n (%)	25 (12.5)
Presence of PsA, n (%)	81 (41.5)

Numerical data are expressed as the $\bar{X}$±SD. Categorical data are expressed as the frequency (percentage). BMI: Body mass index; PASI: Psoriasis Area and Severity Index; PsA: Psoriatic arthritis; SD: Standard deviation.

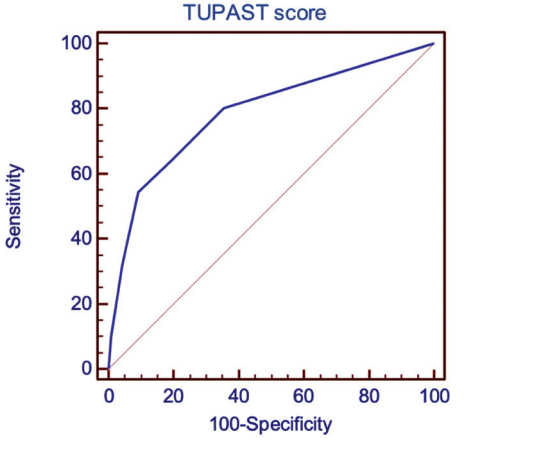
Arthritis was detected in 81 (40.5%) of the patients. The most common type of arthritis was axial spondylopathy in 46 patients. While there was a female predominance in the PsA group (51 women, 30 men), the majority of the non-arthritis group were male (69 men, 50 women) ($p<0.05$). There was no difference between the arthritis and non-arthritis groups in terms of family history ($p=0.86$).

When examining the treatment distributions of patients at the time they completed the questionnaires, it was observed that 15.5% were untreated, 12.5% were on topical treatments, 13% were on conventional treatments, and 59% were on biological treatments (31% anti- tumor necrosis factor, 28% interleukin inhibitors). However, there was no statistically significant difference for achieving the Turkish Psoriatic Arthritis Screening Tool (TUPAST) cut-off and joint involvement across the existing treatments.

The reliability coefficient was calculated as 0.75, confirming reliability for the TUPAST questionnaire. Receiver Operating Characteristics (ROC) analysis of the TUPAST scale obtained an AUC score of 0.78,

and the area under the curve was found to be statistically significant. The cut-off value calculated according to the Youden J index was >3. The sensitivity of the cut-off value was 54.32% and the specificity was 90.68%. It can be inferred that patients with a TUPAST score greater than 3 may have PsA (Figure 1). The mean TUPAST score was 3.2 in PsA patients and 1.2 in patients without arthritis. In the TUPAST questionnaire, the scores of the PsA group differed significantly from the patient group without arthritis. The cut-off value obtained for ToPAS 2 was 8, with a sensitivity of 79% and a specificity of 55% in our patient population. The mean ToPAS 2 score for patients with axial involvement was 7.6 (cut-off: 8), while the mean TUPAST score was 3.4 (cut-off: 3). Additionally, 65.2% of patients with axial involvement exceeded the TUPAST cut-off.

The mean time spent by patients completing the TUPAST and ToPAS 2 questionnaires was also estimated. The mean time to complete the TUPAST questionnaire was calculated as 30 seconds (0.5 minutes). The mean time for the same patients to complete the ToPAS 2 questionnaire was 215 seconds (3.6 minutes). There was a significant difference between the two tests in terms of time spent answering questions ($p<0.05$).



Area under the ROC curve (AUC)				0,787
Standard Error [a]				0,0336
95% Confidence Interval [b]				0,723 to 0,842
z statistic				8,546
Significance level P (Area=0.5)				<0,0001
Criterion	Sensitivity	95% CI	Specificity	95% CI
>3 *	54,32	42,9- 65,4	90,68	83,9- 95,3

FIGURE 1: ROC curve analysis
TUPAST: Turkish Psoriatic Arthritis Screening Tool; CI: Confidence interval.

DISCUSSION

Dermatologists play a critical role in the early detection of PsA, as up to 84% of PsA patients first present with skin manifestations, such as psoriasis.[3,11] The prevalence of undiagnosed PsA was 15.5% when all studies were considered.[3] Also, given that joint damage can occur within a few years, early diagnosis is crucial to prevent irreversible damage. However, dermatologists often lack routine screening practices for PsA, which can delay diagnosis. Ideally, dermatologists should screen for PsA manifestations, including arthritis, dactylitis, enthesitis, and spondylitis, during each visit with patients diagnosed with psoriasis.[12] Early screening algorithms have been recommended to help dermatologists identify PsA earlier, improving long-term outcomes. Screening tools include PEST, PASE, ToPAS, the updated ToPAS 2, and EARP.[6-8,13] However, there is ongoing debate about which tool is most effective for clinical use.

An analysis of 14 distinct screening tools used in 27 studies revealed that the EARP questionnaire demonstrated slightly superior accuracy compared to ToPAS, PEST, and PASE tools.[14] The PASE questionnaire was translated into Turkish by Oyur et al., but it was found to be inadequate for identifying PsA in the Turkish population due to cultural differences and the inactive disease status during the questionnaire administration.[15] ToPAS 2 was validated by Duruöz et al. in the Turkish population, and the Turkish version of ToPAS 2 was found to have high sensitivity and specificity.[10]

Although it has been suggested that ToPAS 2 may be sufficient for detecting arthritis, and the Turkish version is suitable for rheumatologists, there is still a need for a simpler questionnaire for dermatologists. This is especially necessary for busy dermatology outpatient clinics to avoid missing the early signs of PsA. ToPAS 2 was also found to be weak in diagnosing axial PsA. On the other hand, TUPAST proved to be successful in diagnosing axial PsA. In the TUPAST questionnaire, the scores of the PsA

group differed significantly from the non-arthritis group. The mean score was 3.2 in the PsA group, while the median score was 1.2 in the non-arthritis group. ROC analysis was performed for TUPAST, and the cut-off value was set at >3, meaning that patients with a score higher than 3 were considered to have PsA. TUPAST also took less time to complete compared to the Turkish ToPAS 2. The Turkish ToPAS 2 took 3.6 minutes to complete, while TUPAST only took 0.5 minutes.

More recently, the Psoriatic Arthritis Uncluttered Screening Evaluation (PURE-4) questionnaire was proposed for the initial diagnosis of PsA.[16] The PURE-4 was developed after a thorough review of the literature regarding symptoms related to PsA. The questionnaire includes items such as dactylitis, inflammatory heel pain, bilateral buttock pain, and peripheral joint pain with swelling before the age of 50. However, this scale has not been translated or validated in the Turkish population, and we did not use this questionnaire for comparison.

CONCLUSION

In conclusion, PsA screening by dermatologists can be the first step in the diagnosis of joint involvement in psoriasis. Dermatologists are positioned to identify early signs of PsA such as dactylitis, enthesitis, and other musculoskeletal inflammatory disorders. Due to the heavy patient traffic in dermatology outpatient clinics, we need tests that do not take much time. TUPAST is a simple and short screening test that takes only 30 seconds to answer and can be used in the pre-diagnosis of PsA.

Source of Finance

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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.

Authorship Contributions

Idea/Concept: *Nahide Onsun;* ***Design:*** *Nahide Onsun, Ozan Volkan Yurdakul, Begüm Güneş;* ***Control/Supervision:*** *Nahide Onsun, Ozan Volkan Yurdakul;* ***Data Collection and/or Processing:*** *Ozan Volkan Yurdakul, Begüm Güneş, Elif Uğurlu, Didem Dizman, Nazan Taşlıdere;* ***Analysis and/or Interpretation:*** *Ayşegül Yabacı Tak;* ***Literature Review:*** *Nahide Onsun, Begüm Güneş;* ***Writing the Article:*** *Nahide Onsun;* ***Critical Review:*** *Nahide Onsun;* ***References and Fundings:*** *Nahide Onsun;* ***Materials:*** *Nahide Onsun, Ozan Volkan Yurdakul, Begüm Güneş.*

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