

# **Dermatological Health**

Editors-in-Chief

**Shauna Higgins**

*University of Southern California, USA*

**Li He**

*Yunnan Dermatology Hospital, China*

BIO-BYWORD SCIENTIFIC PUBLISHING PTY LTD

(619 649 400)

Level 10

50 Clarence Street

SYDNEY NSW 2000

Copyright © 2025. Bio-Byword Scientific Publishing Pty Ltd.

Complimentary Copy



## Dermatological Health

### Focus and Scope

*Dermatological Health* is a peer-reviewed, open access journal that publishes original research articles and review articles related to the prevention, diagnosis, and treatment of disorders of the skin, hair, and nails. The covered topics include, but are not limited to: clinical, investigative, and population-based studies, healthcare delivery and quality of care research, high quality, cost effective, and innovative treatments, new diagnostic techniques, and other topics related to the prevention, diagnosis, and treatment of disorders of the skin, hair, and nails. Each issue includes continuing medical education articles designed to fill practice and knowledge gaps in the delivery of dermatologic care.

### About Publisher

Bio-Byword Scientific Publishing is a fast-growing, peer-reviewed and open access journal publisher, which is located in Sydney, Australia. As a dependable and credible corporation, it promotes and serves a broad range of subject areas for the benefit of humanity. By informing and educating a global community of scholars, practitioners, researchers and students, it endeavors to be the world's leading independent academic and professional publisher. To realize it, it keeps creative and innovative to meet the range of the authors' needs and publish the best of their work.

By cooperating with University of Sydney, University of New South Wales and other world-famous universities, Bio-Byword Scientific Publishing has established a huge publishing system based on hundreds of academic programs, and with a variety of journals in the subjects of medicine, construction, education and electronics.

### Publisher Headquarter

BIO-BYWORD SCIENTIFIC PUBLISHING PTY LTD

Level 10

50 Clarence Street

Sydney NSW 2000

Website: [www.bbwpublisher.com](http://www.bbwpublisher.com)

Email: [info@bbwpublisher.com](mailto:info@bbwpublisher.com)

## Table of Contents

- 1 Validation of the Reliability and Validity of PSAQCSD, a Psychosocial Adaptation Assessment for Patients with Chronic Urticaria**  
*Song Li, Aijun Chen*
  
- 11 Real-World Study on Adverse Reactions to Technetium (Tc99m) Medronate Based on VigiAccess Database Mining**  
*Weigang Liu, Qian Wu, Heqing Tang*





# Validation of the Reliability and Validity of PSAQ-CSD, a Psychosocial Adaptation Assessment for Patients with Chronic Urticaria

Song Li<sup>1</sup>, Aijun Chen<sup>2\*</sup>

<sup>1</sup>First Affiliated Hospital of Army Military Medical University, Chongqing 404000, China

<sup>2</sup>The First Affiliated Hospital of Chongqing Medical University, Chongqing 404000, China

*\*Author to whom correspondence should be addressed.*

**Copyright:** © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

**Abstract:** *Objective:* This study aims to verify the reliability and validity of the Chinese version of the Psychosocial Adaptation Questionnaire (PSAQ-CSD) in patients with chronic urticaria (CU), to assess their psychosocial adaptation levels. *Methods:* The study involved 102 confirmed cases of chronic urticaria. The PSAQ-CSD was translated and culturally adapted for Chinese use, followed by a pre-survey validation. Exploratory factor analysis and Cronbach's  $\alpha$  coefficient were used to test the construct validity, internal consistency reliability, and criterion-related validity of the scale. *Results:* The Cronbach's  $\alpha$  coefficient for the Chinese version of the PSAQ-CSD was 0.930, indicating good internal consistency. Exploratory factor analysis showed a KMO value of 0.848 and a cumulative variance contribution rate of 65.142%, consistent with the original scale structure. Criterion-related validity analysis revealed strong correlations between the PSAQ-CSD and the CU-Q2oL scale in emotional, self-cognitive, and social dimensions. All correlations were statistically significant,  $P < 0.05$ . *Conclusion:* The Chinese version of the PSAQ-CSD demonstrates good reliability and validity in patients with chronic urticaria, making it an effective tool for assessing psychosocial adaptation. It can comprehensively reflect patients' emotional states, self-cognition, and social adaptation, providing a theoretical basis for clinical intervention and psychological support. Future research should expand the sample size and consider more cultural and social factors to enhance the application range and accuracy of the scale.

**Keywords:** Chronic urticaria; Psychosocial adaptation; Reliability and validity; PSAQ-CSD scale; Scale validation; Quality of life

**Online publication:** July 11, 2025

## 1. Introduction

Chronic urticaria (CU) is a common skin condition characterized by recurrent wheals and itching that persist for more than six weeks. For patients with chronic urticaria, in addition to physical discomfort, psychological and

social adaptation issues are also key areas of focus for researchers. Generally, the assessment of social adaptation ability in patients with chronic urticaria revolves around psychological burden and emotional distress, as well as impaired quality of life and social functioning <sup>[1]</sup>.

To address the psychological and social adaptation issues of patients with chronic urticaria, researchers have made many efforts, particularly in developing and promoting scales. Scales are essential tools for assessing the impact of the disease on patients' quality of life, mental state, and social adaptation. Two widely used scales are the DLQI (Dermatology Life Quality Index) and the Chinese version of the CU-Q2oL scale (Chronic Urticaria Quality of Life Questionnaire). The DLQI is a widely used dermatological quality of life assessment tool developed by British scholars Finlay and Koren in 1994 <sup>[2]</sup>. Its aim is to evaluate the effects of skin diseases (including chronic urticaria) on patients' daily living, mental health, and social functioning. The CU-Q2oL scale is a quality of life assessment tool specifically developed for patients with chronic urticaria, first proposed by Baiardini and his team in 2005, and validated globally since <sup>[3]</sup>. This scale focuses on evaluating the impact of chronic urticaria on patients' quality of life, especially in terms of psychological and social adaptation. Subsequently, Chinese scholars developed a cross-cultural optimized version of this scale.

In 2021, Zhang *et al.* proposed a simplified self-assessment scale for chronic skin disease patients aged 18 and above, known as the Psychosocial Adaptation Questionnaire (PSAQ-CSD). Although it has been proven to have good reliability and validity in the assessment of conditions such as vitiligo and psoriasis <sup>[4]</sup>, it also exhibits different factor structures and reliability across various diseases and research populations. Currently, there is no application of the PSAQ-CSD for assessing psychosocial adaptation in CU patients in China. Therefore, the results of this study's reliability and factor analysis provide a basis for using the PSAQ-CSD to evaluate psychosocial adaptation in CU patients.

## 2. Object and methods

### 2.1. Object

The PSAQ-CSD (Psychosocial Adaptation Questionnaire for Chronic Skin Disease Patients) was developed by Chinese scholars Zhang *et al.* The development is based on grounded theory under constructivist theory, combined with semi-structured interviews and participant observation to conduct qualitative research, collecting relevant data for the initial construction of scale items and item pools. It is primarily applicable to patients with chronic skin disease (CSD). This scale aims to assess the psychosocial adaptation (PSA) level of patients when facing chronic skin disease.

The source scale consists of 18 items and is divided into three dimensions based on exploratory and confirmatory factor analysis: the emotional dimension, the self-cognition dimension, and the social dimension. After a step-by-step selection and analysis, the number of items for each dimension was finalized as follows: 8 items for the emotional dimension, 6 items for the self-cognition dimension, and 4 items for the social dimension.

The scale was scored using a 5-point Likert scale with options of "always," "often," "sometimes," "rarely," and "never." The higher the score, the better the patient's psychosocial adaptation level. After patients filled in the questionnaire, medical staff evaluated it according to the scoring method.

PSAQ-CSD underwent a rigorous test of reliability and validity during development: it was evaluated through expert review and content validity index (CVI). The initial version of the CVI ranged from 0.767 to 0.967, with an average of 0.912, indicating high content validity of the scale. Internal consistency of the scale was also confirmed,

and it demonstrated good reliability.

## **2.2. Localization of PSAQ-CSD**

### **2.2.1. Scale translation**

After contacting the original author, the authorization of the scale was obtained and we translated and revised the scale strictly in accordance with the principles of the Brislin translation model, that is, following the standard of positive translation and back translation<sup>[5]</sup>.

#### **(1) Correct translation**

In this study, a graduate student majoring in translation with CET-6 certificate was hired as translator A and a senior dermatologist B working in the dermatology department to translate the text into version 1 and version 2 respectively. The two versions were integrated to obtain version 1 of the correct translation.

Invite another in-service medical English teacher from a university to independently conduct the translation, achieving version 4; invite a nurse from our hospital's dermatology department to translate using translation software, achieving version 5. Integrate both and revise them in conjunction with the correct translation version 1, achieving the back-translation version 1.

Considering that the original author of the scale is Chinese, the translated version was sent back to the original author for review and verification to confirm that the translated version was semantically consistent with the source scale and formed the Chinese version.

#### **(2) Adjustment of scale for cross-cultural adaptation**

Although the original authors of the scales are all Chinese and have lived in their native language environment for a long time, the specific connotations of psychosocial adaptation (PSA) may be influenced by culture. For example, some cultures may place greater emphasis on individual emotional management, while others may focus more on support from groups or society. Therefore, the dimensions and items of the scale need to be appropriately adjusted in different cultural contexts to ensure that the content assessed has consistent meaning across cultures. Since the development of the source scale did not take into account the Chinese context and cultural environment, adjustments are necessary.

This study invited 11 relevant experts from our institute to participate in cross-cultural calibration work. All experts are from this department, with 7 males and 4 females; two hold doctoral degrees, and the rest have master's degrees. After comprehensively considering the opinions of the experts, the statement "I still consider myself an attractive person" in the first Chinese version was changed to "I believe that I have not been alienated after suffering from this illness"; and "After developing skin disease, I still believe that most problems can be solved through necessary efforts" was changed to "Skin issues have not affected my economic/social status."

### **2.2.2. Preliminary survey verification**

Using the random sampling method, we conducted a sample of urticaria patients who visited our hospital from January to February 2024. The scale was used for face-to-face interviews with 40 individuals. Among them, there were 16 males and 24 females; their ages ranged from 21 to 43 years (mean age was  $26 \pm 4.32$ ). Inclusion criteria: (1) Age over 18 years old; (2) Diagnosed with chronic urticaria by a local secondary or higher-level hospital; (3) Clear consciousness and able to communicate normally; (4) Capable of completing the questionnaire independently or with assistance from a researcher. Exclusion criteria: Patients with severe hearing impairment, communication barriers, or impaired consciousness who cannot cooperate with the survey and scale evaluation.

During the preliminary survey, researchers assessed each patient's understanding, acceptance, and experience in filling out the items and options of the scale, making appropriate adjustments for any difficult or questionable points.

## **2.3. Validation of the reliability and validity of the scale**

### **2.3.1. Study sample inclusion**

Patients diagnosed with chronic urticaria from February to July 2024 were included in this study. The inclusion and exclusion criteria were the same as those for the preliminary survey. The final inclusion was based on random sampling, with the sample size estimated to be five times the number of items on the scale. Ultimately, 102 samples were included. All participants signed informed consent forms. The study subsequently received approval from the Medical Ethics Committee of our hospital, with the approval number [Hospital Review No.] 2024XXXX.

### **2.3.2. Investigation items included**

#### **(1) Demographic criteria**

In order to determine the demographic characteristics applicable to the scale, after a review of the literature, age, place of residence, cultural status, and gender were selected as demographic characteristics and grouped separately before the scale.

#### **(2) Psychosocial adaptation assessment scale (PSAQ-CSD)**

The final table obtained by the process of **2.2.** and **2.3.** has 18 items and three dimensions, and the average time for filling in the pre-survey is 5 minutes.

#### **(3) Chinese version of DLQI scale**

The Chinese version of the DLQI scale, developed by Wang *et al.*, consists of 10 questions covering symptom perception, daily activities, leisure activities, work and study, personal activities, and treatment. Each question uses a 4-point rating system, with 0 to 3 representing “none,” “less,” “severe,” and “very severe,” respectively, for a total score of 30. Higher scores indicate poorer quality of life. The correlation coefficient between the total scores of the two measurements is statistically significant, indicating good stability of the scale. The correlation coefficient between the total scores of the two measurements is 0.876, with a reliability value of 0.8746 and a Cronbach's  $\alpha$  coefficient of 0.8738 <sup>[6]</sup>.

#### **(4) Chinese version of chronic urticaria quality of life questionnaire**

The scale consists of 23 items, where patients self-report the impact of CU on HRQoL over the past 14 days using a Likert 5-level scoring system. The raw scores are linearly transformed, resulting in a scale score range of 0 to 100 points. The KMO value for CU-Q2oL is 0.923, and the Bartlett's test of sphericity reaches a significant level ( $\chi^2 = 4109.608$ ,  $P < 0.001$ ), with  $r$  ranging from 0.363 to 0.876 <sup>[7]</sup>.

### **2.3.3. Item analysis of the scale**

- (1) Critical ratio method: Calculate the total score of the scale and rank it from highest to lowest. Use 27% as the threshold to divide the high and low score groups of the total score. Determine whether there is a statistically significant difference in TSCS item scores between the two groups ( $P < 0.05$ ). If  $|t|$ , the decision value (Critical Ratio, CR)  $< 3$ , it indicates that the item has poor discriminative power and should be considered for deletion <sup>[8]</sup>;
- (2) Correlation coefficient method: The correlation coefficient of Pearson was used to test the correlation

between the total score of the scale and the scores of each item. If the correlation coefficient  $< 0.4$ , it was considered that the heterogeneity of this item with the total score of the scale was high<sup>[8]</sup>, and it was considered to be deleted  $|r|$ .

#### 2.3.4. Validity verification

Factor analysis was conducted using principal component analysis and maximum variance rotation<sup>[9]</sup>. When the KMO value  $> 0.6$  and the Bartlett's test for sphericity shows significant differences ( $P < 0.05$ ), it indicates that EFA is suitable. Through orthogonal rotation using the maximum variance method, common factors with eigenvalues  $\geq 1$  and loadings  $> 0.4$  were selected, ensuring that the cumulative variance contribution rate  $> 50\%$ , while also considering items with loadings  $< 0.4$  for removal. Criterion-related validity: The widely recognized ASASR-C scale was used as the criterion, and its correlation with the Chinese version of TSCS was calculated using Pearson correlation analysis. When the correlation coefficient  $r > 0.4 / r < -0.4$ , it indicates an ideal criterion-related validity<sup>[10]</sup>.

#### 2.3.5. Reliability verification

Internal consistency reliability, split-half reliability, and retest reliability were used to test the reliability. Content consistency reliability: commonly reflected by Cronbach's  $\alpha$  coefficient, which takes the value of 0~1. Generally, Cronbach's  $\alpha$  coefficient  $> 0.7$  indicates that the internal reliability of the scale is acceptable.

### 2.4. Statistical methods

Statistical analysis was performed by STATA 17.0 software. Measurement data were used [mean  $\pm$  standard deviation (SD)] indicates that the data for count information are described using frequency and percentage. The Pearson correlation-related validation was used to verify the validity of the scale. Differences with  $P < 0.05$  are considered statistically significant.

## 3. Results

### 3.1. General data

A total of 110 patients completed the PSAQ-CSD questionnaire, among whom 102 patients also completed the DLQI and CU-Q2oL questionnaires. Among the 94 patients, 40 were male (39.2%) and 62 were female (60.8%), with an age range of  $15.64 \pm 11.89$  years (19–42 years); the disease duration [M (P25, P75)] was 7 (3, 18) months. Of the 102 patients, all were CSU patients. According to the sample size requirements for the applicability study of the scale, statistical analyses were conducted on the structural validity, internal consistency, convergent validity, and known-groups validity of the CSU patient quality of life questionnaire.

### 3.2. Item analysis of the scale

The total scores were ranked from high to low, and the top 27% were selected as the high score group and the bottom 27% as the low score group. Then, an independent sample  $t$ -test was used to explore the differences in scale item scores between the high and low groups, and the CR value of each item was calculated; a Pearson correlation test was used to obtain the  $r$  value, and **Table 1** was summarized.



**Table 1.** Chinese version PSAQ-CSD item analysis

Clauses and subclauses	Low score group	High score group	CR value	<i>r</i>
1	2.107 ± 0.916	4.321 ± 0.944	51.39157	0.7301
2	1.678 ± 0.722	4.25 ± 0.751	65.5843	0.7876
3	1.892 ± 0.737	4.178 ± 0.669	64.51176	0.7868
4	1.857 ± 0.803	4.214 ± 0.786	52.19262	0.7297
5	1.75 ± 0.844	4.214 ± 0.738	54.85183	0.7854
6	1.571 ± 0.634	4.392 ± 0.737	83.53017	0.8278
7	1.607 ± 0.566	4.107 ± 0.737	74.96952	0.8095
8	1.642 ± 0.731	4.285 ± 0.762	64.94343	0.8468
9	4.107 ± 0.737	1.607 ± 0.566	57.08451	0.6537
10	3.892 ± 0.737	2 ± 0.816	55.51416	0.6402
11	4.107 ± 0.628	2.035 ± 0.744	60.01173	0.6807
12	3.821 ± 0.722	1.928 ± 0.716	56.13611	0.6367
13	4 ± 0.861	1.964 ± 0.792	49.08427	0.6714
14	4.071 ± 0.813	2.357 ± 0.78	84.38435	0.6512
15	1.571 ± 0.690	4.214 ± 0.738	75.62884	0.8321
16	1.928 ± 0.766	4.428 ± 0.741	71.60078	0.7745
17	1.642 ± 0.780	4.035 ± 0.744	99.135	0.7336
18	1.464 ± 0.576	4.178 ± 0.669	68.58126	0.8332

Note: CR is the decision value; all  $P < 0.001$

### 3.3. Scale validity verification

#### 3.3.1. Structural validity

The exploratory factor analysis results show that the KMO value of PSAQ-CSD is 0.848, and B, Bartlett's test for sphericity rejects the null hypothesis, indicating strong correlations among the variables. The variance contribution table reveals that three common factors have eigenvalues greater than 1, so the first three common factors are extracted. The cumulative variance contribution of the three common factors is 65.142%, indicating that these three common factors can explain 65.142% of the variation in all variables, with a good degree of explanation. After rotating the extracted three common factors, the rotated factor loading table is obtained, where PQ1-8 has a high load on the first factor, PQ9-PQ14 has a high load on the second factor, and PQ15-PQ18 has a high load on the third factor, consistent with the expected dimensionality, demonstrating good validity.

The common factor number is consistent with the original scale dimension, and the loading value of 13 items in their respective common factors is 0.7887~0.896, all exceeding 0.4, indicating a clear factor structure. The specific component eigenvalues are shown in **Table 2**.

**Table 2.** Factor loadings of each item in the Chinese version of PSAQ-CSD

Clauses and subclauses	Factor 1	Factor 2	Factor 3
1	0.7943		
2	0.8444		
3	0.8294		
4	0.7961		
5	0.8162		
6	0.885		
7	0.8579		
8	0.8581		
9		0.8491	
10		0.8594	
11		0.8667	
12		0.8449	
13		0.8005	
14		0.7903	
15			0.8929
16			0.8557
17			0.7887
18			0.9039

### 3.3.2. Cronbach's $\alpha$ coefficient test and calibration correlation validity

The Cronbach's  $\alpha$  coefficient was used to test the scale, and the Cronbach's  $\alpha$  coefficient was 0.930.

The correlation validity of the calculation was then calculated to obtain **Table 3**.

**Table 3.** School standard correlation validity table

	Chinese version of PSAQ-CSD	Emotional dimension	Self-cognition dimension	Social dimension	Chinese version CU-Q2oL
Chinese version of PSAQ-CSD	1				
Emotional dimension	0.9432	1			
Self-cognition dimension	-0.784	-0.927	1		
Social dimension	0.922	0.9183	-0.8982	1	
Chinese version CU-Q2oL	0.8783	0.9484	-0.9405	0.9294	1

## 4. Discussion

### 4.1. Applicability and clinical significance of Chinese version PSAQ-CSD

This study strictly adhered to standard procedures, ensuring the consistency and equivalence of the translated PSAQ-CSD with the original version. Through cross-cultural testing, it was confirmed that the scale could be

correctly understood and recognized by Chinese patients with chronic urticaria. The translated items are clear and concise, with language that is easy to understand. Patients can complete the questionnaire within 5 minutes, and a completion rate of 92.35% demonstrates that the scale is well-received by patients, meeting their practical needs for addressing awkward situations when facing medical professionals <sup>[11]</sup>.

This study aims to validate the reliability and validity of the Chinese version of the PSAQ-CSD scale in patients with chronic urticaria, providing scientific evidence and tool support for assessing psychosocial adaptation in chronic urticaria patients. Through rigorous translation, cross-cultural adaptability adjustments, pre-survey validation, and formal survey reliability and validity analysis, this paper has achieved satisfactory results. The specific discussion will focus on the following aspects: scale reliability analysis, validity analysis, comparison with existing scales, and limitations of the study.

#### **4.2. Reliability analysis of the scale**

This study conducted reliability tests on the Chinese version of the PSAQ-CSD scale using three methods: internal consistency, split-half reliability, and test-retest reliability. The results showed that the scale has good internal consistency, with a Cronbach's  $\alpha$  coefficient as high as 0.930, significantly exceeding the conventional acceptance standard of 0.7, indicating that the scale has good reliability in measuring psychosocial adaptation in patients with chronic urticaria. This result is consistent with the reliability validation results of the scale in other chronic skin disease patients, further confirming its applicability across different diseases.

In addition, the scale performed exceptionally well in item analysis. By analyzing the items using critical ratio and correlation coefficient methods, all items demonstrated good discriminant validity and high correlations. Particularly, the items on the emotional and social dimensions showed significant differences, effectively distinguishing between high and low score groups. Therefore, it can be concluded that the PSAQ-CSD has reliable reliability in chronic urticaria patients and can be used as an assessment tool in clinical and research settings.

#### **4.3. Scale validity analysis**

In the validity analysis, we first validated the structural validity of the scale through exploratory factor analysis. The results showed that the factor structure of PSAQ-CSD in patients with chronic urticaria was as expected, with clear factor loadings for all three dimensions and a variance contribution rate of 65.142%. These findings were consistent with the original structure of the scale, further supporting its effectiveness. In particular, the emotional, self-cognition, and social dimensions matched the three dimensions originally designed, indicating that the scale can comprehensively assess the psychosocial adaptation level of patients with chronic skin diseases. The exploratory factor analysis revealed a KMO value of 0.848 for PSAQ-CSD, and the Bartlett's test of sphericity rejected the null hypothesis, suggesting strong correlations among variables, making it suitable for factor analysis. The cumulative variance contribution rate of the three extracted common factors was 65.142%, with PQ1-8 having a high loading on the first factor (emotional dimension), PQ9-PQ14 having a high loading on the second factor (self-cognition dimension), and PQ15-PQ18 having a high loading on the third factor (social dimension). This aligns closely with the expected dimensional divisions, demonstrating excellent structural validity. This means that the scale can effectively measure its intended psychosocial adaptation structure, accurately reflecting the psychological and social adaptation of CSU patients from multiple dimensions. The psychological, self-cognition, and social adaptation status provide a comprehensive and effective perspective for clinicians and researchers to understand the psychosocial status of patients in depth.



Further, the test-retest reliability of the scale has also been verified. The correlation analysis results of the Chinese version CU-Q2oL scale show that PSAQ-CSD and CU-Q2oL exhibit strong correlations in emotional dimensions, self-cognition dimensions, and social dimensions, especially in emotional and social dimensions, with correlation coefficients of 0.9484 and 0.9294, respectively, indicating good external validity. This suggests that the PSAQ-CSD scale not only accurately reflects the psychosocial adaptation of patients with chronic urticaria but is also closely related to their quality of life, demonstrating good validity.

#### **4.4. Comparison with existing scales**

This study also compared the Chinese version of PSAQ-CSD with traditional chronic urticaria quality of life assessment tools, such as the Chinese version of DLQI and CU-Q2oL scales. The DLQI, a widely used dermatological quality of life scale, is extensively applied in clinical settings but primarily focuses on assessing the impact of skin conditions on daily activities, with limited attention to evaluating patients' mental health. In contrast, the CU-Q2oL scale specifically addresses the effects of chronic urticaria on patient quality of life, covering aspects from symptom perception to treatment processes, effectively reflecting the quality of life for patients with chronic urticaria. However, these scales are not yet fully adequate for assessing patients' psychosocial adaptation issues.

In contrast, the PSAQ-CSD scale is designed with a greater focus on assessing psychosocial adaptation in a specific domain, making it more targeted. It can systematically evaluate the adaptation status of patients with chronic urticaria from multiple perspectives, including emotional, self-awareness, and social dimensions. Therefore, it has unique advantages in psychological, sociological, and clinical medical research. This study has validated that PSAQ-CSD is more effective and reliable in assessing psychosocial adaptation in patients with chronic urticaria compared to existing scales, making it a new and promising assessment tool.

#### **4.5. Limitations of the study**

Despite the satisfactory results of the reliability and validity validation in this study, some limitations still exist. First, the sample size is relatively small, consisting of only 102 patients with chronic urticaria, and the samples mainly come from a single hospital, which may limit the external validity to some extent. Future research should be conducted on a larger scale, especially across different regions and hospitals, to further ensure its broad applicability and reliability.

At the same time, this study only used self-report scales for assessment, which may introduce some subjective bias. Although various methods were employed to verify the reliability and validity of the scales during the research process, in practice, patients' psychosocial adaptation can be influenced by multiple complex factors. Future research could consider combining clinical assessments and observational studies to obtain more comprehensive and objective evaluation results.

Finally, although this study has conducted the translation and cross-cultural adaptation of the scale, cultural differences may still influence the specific connotations of psychosocial adaptation. Therefore, research on adaptation under different cultural backgrounds remains an important topic for future studies. Cross-cultural research can help further improve and optimize the applicability and universality of the scale, ensuring its effective use globally.

## 5. Conclusion

In short, this study validates the good reliability and validity of the Chinese version of the PSAQ-CSD scale in patients with chronic urticaria and demonstrates its significant value in psychosocial adaptation assessment. It not only comprehensively evaluates patients' emotional states, self-perception, and social adaptation but also serves as a scientific tool for assessing psychosocial adaptation in patients with chronic urticaria, providing a theoretical basis and practical guidance for clinical interventions and psychosocial support. Future research should further expand sample sizes and consider more cultural and social factors to enhance the applicability and accuracy of the scale.

## Disclosure statement

The authors declare no conflict of interest.

## References

- [1] Liu K, Zhang S, Wang R, et al., 2024, Research Progress on Psychosomatic Intervention of Chronic Urticaria. *Journal of PLA Medical College*, 45(09): 996–999 + 1005.
- [2] Finlay AY, Khan GK, 1994, Dermatology Life Quality Index (DLQI)—A Simple Practical Measure for Routine Clinical Use. *Clinical and Experimental Dermatology*, 19(3): 210–216.
- [3] Baiardini I, Pasquali M, Braido F, et al., 2005, A New Tool to Evaluate the Impact of Chronic Urticaria on Quality of Life: Chronic Urticaria Quality of Life Questionnaire (CU-Q2oL). *Allergy*, 60(8): 1073–1078.
- [4] Zhang X, Xu H, Wang A, 2021, Development and Evaluation of the Psychosocial Adaptation Questionnaire Among Patients with Chronic Skin Disease. *Dermatology*, 237(4): 641–648.
- [5] Wang X, Xia H, 2016, Construction and Application of a New Translation Model Based on the Classic Brislin Back-Translation Model. *Journal of Nursing*, 31(07): 61–63.
- [6] Wang X, Zhao T, Zhang X, 2004, Preliminary Study on Reliability and Validity of Quality of Life Indicators for Skin Diseases in Simplified Chinese. *Chinese Journal of Epidemiology*, (09): 63–65.
- [7] Yu M, Chen Y, Liu B, et al., 2020, Validation of the Chinese Version of Chronic Urticaria Quality of Life Questionnaire (CU-Q2oL). *Chinese Journal of Dermatology*, 53(12): 6.
- [8] Wu M, 2010, Practical Statistical Analysis of Questionnaire: SPSS Operation and Application, Chongqing University Press, Chongqing.
- [9] Schreiber JB, 2021, Issues and Recommendations for Exploratory Factor Analysis and Principal Component Analysis. *Research in Social and Administrative Pharmacy*, 17(5): 1004–1011.
- [10] Wang W, Wang S, Sun Q, et al., 2024, Translation and Psychometric Validation of the Patient Participation Culture Tool for Healthcare Workers in Chinese Nursing Context. *BMC Nursing*, 23(1): 565.
- [11] Zhu H, Pang Y, Li F, et al., 2020, Assessment of Quality of Life and Influencing Factors in Patients with Chronic Urticaria. *Chinese Journal of Integrated Traditional and Western Medicine in Dermatology*, 19(06): 536–539.

### Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

# Real-World Study on Adverse Reactions to Technetium (Tc99m) Medronate Based on VigAccess Database Mining

Weigang Liu<sup>1,2</sup>, Qian Wu<sup>1,3</sup>, Heqing Tang<sup>1,2\*</sup>

<sup>1</sup>The First Clinical Medical College of Three Gorges University, Yichang 443003, Hubei, China

<sup>2</sup>Department of Pain, Yichang Central People's Hospital, Yichang 443003, Hubei, China

<sup>3</sup>Department of Operating Room, Yichang Central People's Hospital, Yichang 443003, Hubei, China

\*Corresponding author: Heqing Tang, lwgtjmu001@outlook.com

**Copyright:** © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

**Abstract:** *Objective:* This study aims to explore adverse events related to Technetium (Tc99m) Medronate using the VigAccess database, uncover potential risk signals, and provide comprehensive reference for rational clinical drug use to ensure patient safety. *Methods:* The study retrieved adverse event reports related to Technetium (Tc99m) Medronate from the VigAccess database, preprocessed the data, and employed the Reporting Odds Ratio (ROR) method to detect signals and analyze the characteristics and intensity of adverse events. *Results:* A total of 543 adverse event reports related to Technetium (Tc99m) Medronate were retrieved. The data showed that reports from female patients accounted for 48.62%, higher than the 26.15% from male patients, and the 18–64 age group had a higher proportion of reports at 52.89%. In terms of adverse event distribution, skin and subcutaneous tissue disorders accounted for 24.12%, general disorders and administration site conditions accounted for 21.68%, and nervous system disorders accounted for 14.83%. These three types of disorders were the most common adverse reactions during the use of Technetium (Tc99m) Medronate. Further ROR analysis revealed strong associations between Technetium (Tc99m) Medronate and adverse events such as product efficacy issues, vasodilation, and decreased therapeutic response. The ROR value for product efficacy issues was as high as 379.29 (95% CI: 180.18, 798.47), vasodilation was 60.75 (95% CI: 45.91, 80.51), and decreased therapeutic response was 36.35 (95% CI: 20.48, 64.81). *Conclusion:* This study analyzed adverse events related to Technetium (Tc99m) Medronate using the VigAccess database, finding that female patients and the age group of 18 to 64 had a higher proportion. The related adverse events were mainly concentrated in skin and subcutaneous tissue disorders, general disorders and administration site conditions, and nervous system disorders. Adverse events such as product efficacy issues, vasodilation, and decreased therapeutic response were strongly associated with Technetium (Tc99m) Medronate, indicating the need for special attention to these adverse reactions in clinical use, strengthening drug monitoring and management to ensure patient safety, and providing important reference for clinicians in the rational use of Technetium (Tc99m) Medronate.

**Keywords:** Technetium (Tc99m) Medronate; VigAccess; Adverse reactions; Signal mining; Reporting odds ratio

**Online publication:** July 11, 2025

## 1. Introduction

Pharmacovigilance is the scientific activity of monitoring adverse drug reactions (ADRs) and related issues during the market use of drugs, which is crucial for ensuring patient safety. VigiAccess is a public database launched by the World Health Organization (WHO) to provide global information on adverse drug reactions. Its data sources are anonymous reports from member countries of the WHO International Drug Monitoring Program (PIDM), covering over 39 million reports. The data from VigiAccess can provide researchers with a global perspective on drug safety information; however, it should be noted that these data only indicate a suspected association between the drug and adverse reactions and do not confirm causality.

Technetium (Tc99m) Medronate is a radiopharmaceutical used to treat diseases such as rheumatoid arthritis and osteoporosis. Its mechanisms of action include inhibiting inflammatory responses, immune modulation, inhibiting bone destruction, and promoting bone repair <sup>[1]</sup>. Clinical studies have shown that Technetium (Tc99m) Medronate has significant efficacy in treating rheumatoid arthritis with relatively few adverse reactions. However, the safety monitoring of the drug is an ongoing process, especially after widespread application, when some adverse reactions not observed in clinical trials may emerge <sup>[2]</sup>. Therefore, utilizing the VigiAccess database to conduct real-world research on adverse events related to Technetium (Tc99m) Medronate can provide a more comprehensive reference basis for rational clinical drug use and further ensure patient safety.

## 2. Data processing and statistical methods

### 2.1. Data source

Data was retrieved from the VigiAccess database (<https://vigiaccess.org/>), data retrieval date was on May 29, 2025.

### 2.2. Data extraction and processing

Using Python 3.10 with the requests package, all drug BASENAMES in the WHO DRUG dictionary were retrieved, and JSON data returned from the front-end page was obtained. The JSON data was visualized using the Pandas package and exported to Excel to complete the download of all publicly available drug data. Subsequent statistical analysis was performed using SAS 9.4 software.

### 2.3. Signal detection methods and calculation

Proportional imbalance method was used for signal detection of adverse drug events. ROR method was employed for detecting adverse event signals.

### 2.4. Target drug

The target drug in this study was Technetium (Tc99m) Medronate.

## 3. Results

### 3.1. Basic characteristics of adverse event reports

**Table 1** presents the analysis results of adverse events related to Technetium (Tc99m) Medronate, mainly showing the basic characteristics of adverse events, including gender, age, region, and report year. In terms of gender distribution, female patients reported the most adverse events, accounting for 48.62% (264 cases), while male patients accounted for 26.15% (142 cases). This indicates that female patients have a higher probability of

reporting adverse reactions when using Technetium (Tc99m) Medronate. Regarding age distribution, the 18–44 age group reported the most adverse events, accounting for 17.13% (93 cases), followed by the 45–64 age group at 23.76% (129 cases), and the 65–74 age group at 10.87% (59 cases). Patients aged 75 and above accounted for 6.63% (36 cases), those aged 12–17 accounted for 3.68% (20 cases), and patients aged 2–11 and 28 days to 23 months reported fewer cases, accounting for 1.1% (6 cases) and 0.55% (3 cases), respectively. From the regional distribution perspective, reports from the Americas were the most, accounting for 90.06% (489 cases) of the total reports, indicating that Technetium (Tc99m) Medronate is more widely used in this region or that the adverse reaction monitoring system in this region is more comprehensive. Reports from Asia, Europe, and Oceania accounted for 1.47% (8 cases), 4.97% (27 cases), and 3.5% (19 cases), respectively. Regarding the report year, adverse events were reported from 1981 to 2024, with fewer early reports. The number of reports increased after 2000, reaching a small peak in 2005 (50 cases, 9.21%).

**Table 1.** Characteristics of adverse event reports

Characteristics	<i>n</i> (%)
Sex	
Female	264 (48.62)
Male	142 (26.15)
Unknown	137 (25.23)
Age	
28 days to 23 months	3 (0.55)
2–11 years	6 (1.1)
12–17 years	20 (3.68)
18–44 years	93 (17.13)
45–64 years	129 (23.76)
65–74 years	59 (10.87)
75 years and above	36 (6.63)
Unknown	197 (36.28)
Continent	
Americas	489 (90.06)
Asia	8 (1.47)
Europe	27 (4.97)
Oceania	19 (3.5)
Report year	
1981	1 (0.18)
1982	5 (0.92)
1983	7 (1.29)
1984	3 (0.55)
1985	5 (0.92)
1986	50 (9.21)

**Table 1 (Continued)**

Characteristics	<i>n</i> (%)
1987	1 (0.18)
1988	20 (3.68)
1989	17 (3.13)
1990	27 (4.97)
1991	19 (3.5)
1992	26 (4.79)
1993	15 (2.76)
1994	33 (6.08)
1995	14 (2.58)
1996	9 (1.66)
1997	7 (1.29)
1998	3 (0.55)
1999	9 (1.66)
2000	24 (4.42)
2001	12 (2.21)
2002	3 (0.55)
2003	12 (2.21)
2004	7 (1.29)
2005	8 (1.47)
2006	7 (1.29)
2007	1 (0.18)
2008	18 (3.31)
2009	7 (1.29)
2010	14 (2.58)
2011	29 (5.34)
2012	5 (0.92)
2013	5 (0.92)
2014	2 (0.37)
2015	9 (1.66)
2016	12 (2.21)
2017	33 (6.08)
2018	14 (2.58)
2019	16 (2.95)
2020	5 (0.92)
2021	5 (0.92)

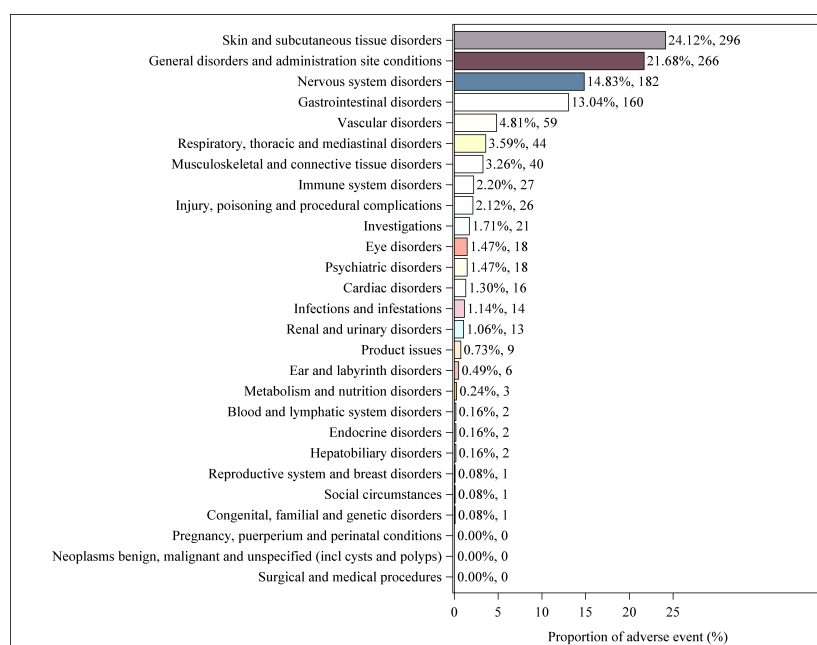


**Table 1 (Continued)**

Characteristics	n (%)
2022	9 (1.66)
2023	4 (0.74)
2024	11 (2.03)

### 3.2. Proportion of adverse events by system organ class

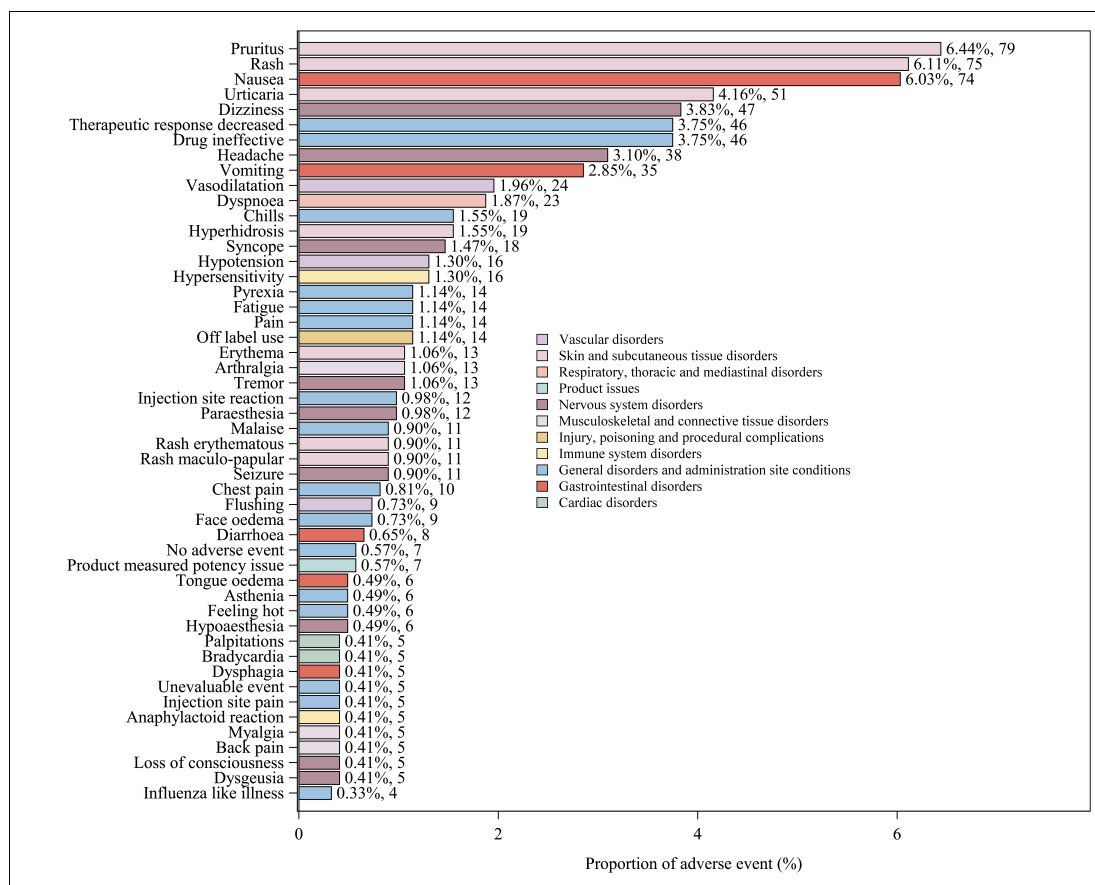
As shown in **Figure 1**, adverse events associated with Technetium (Tc99m) Medronate are primarily concentrated in skin and subcutaneous tissue disorders, general disorders and administration site conditions, and nervous system disorders. Specifically, skin and subcutaneous tissue disorders are the most common, accounting for 24.12% (296 cases) of the total adverse events. General disorders and administration site conditions follow closely, comprising 21.68% (266 cases). This indicates that skin reactions and systemic reactions are relatively common during the use of Technetium (Tc99m) Medronate, requiring special attention. Adverse events related to nervous system disorders account for 14.83% (182 cases), suggesting that the use of Technetium (Tc99m) Medronate may have some impact on the nervous system. Additionally, gastrointestinal disorders account for 13.04% (160 cases), indicating that the drug also has a significant impact on the gastrointestinal tract. Adverse events involving other system organs are relatively fewer. Vascular disorders account for 4.81% (59 cases), respiratory, thoracic, and mediastinal disorders account for 3.59% (44 cases), musculoskeletal and connective tissue disorders account for 3.26% (40 cases), and immune system disorders account for 2.20% (27 cases). Cases of injury, poisoning, and procedural complications account for 2.12% (26 cases), indicating that apart from the main adverse reaction sites, the impact of Technetium (Tc99m) Medronate on other systems cannot be ignored. Systems with relatively fewer reported cases include psychiatric disorders (1.47%, 18 cases), cardiac disorders (1.30%, 16 cases), infections and infestations (1.14%, 14 cases), and renal and urinary disorders (1.06%, 13 cases). Other rarer reactions include ear and labyrinth disorders, metabolic and nutritional disorders, blood and lymphatic system disorders, endocrine disorders, hepatobiliary disorders, reproductive system and breast disorders, social circumstances, congenital, familial and genetic disorders, pregnancy, puerperium and perinatal conditions, neoplasms benign, malignant and unspecified (incl cysts and polyps), and surgical and medical procedures, all with proportions below 1%.



**Figure 1.** Proportion of adverse events by SOC

### 3.3. The proportion of adverse events categorized by preferred terms

**Figure 2** shows that Technetium (Tc99m) Medronate-related adverse events are mainly concentrated in the following categories. Skin and subcutaneous tissue disorders are the most common category of adverse events, with pruritus accounting for 6.44% (79 cases), rash accounting for 6.11% (75 cases), and urticaria accounting for 6.03% (74 cases). This indicates that skin reactions are one of the most common side effects when using Technetium (Tc99m) Medronate. Secondly, adverse events related to the nervous system and systemic reactions are also significant. These include nausea accounting for 4.16% (51 cases), headache accounting for 3.10% (38 cases), dizziness accounting for 3.75% (46 cases), and fatigue accounting for 1.14% (14 cases). Additionally, feedback on decreased efficacy is also quite common, such as therapeutic response decreased accounting for 3.83% (47 cases) and drug ineffective accounting for 3.75% (46 cases), which suggests that attention needs to be paid to the efficacy of Technetium (Tc99m) Medronate and patients' responses to the drug. Adverse events of the respiratory and cardiovascular systems should not be ignored, such as dyspnea accounting for 1.87% (23 cases), syncope accounting for 1.47% (18 cases), and hypotension accounting for 1.30% (16 cases). These reactions indicate that it is necessary to monitor the respiratory and cardiovascular health of patients when using Technetium (Tc99m) Medronate. Other relatively common adverse events include vomiting (accounting for 2.85%, 35 cases), vasodilatation (accounting for 1.96%, 24 cases), fatigue (accounting for 1.14%, 14 cases), and pain (accounting for 1.14%, 14 cases). This shows that Technetium (Tc99m) Medronate may cause reactions in multiple body systems, requiring comprehensive monitoring and management. A few reports include face edema, chest pain, and palpitations, each accounting for less than 1%, but they also need to be noted.

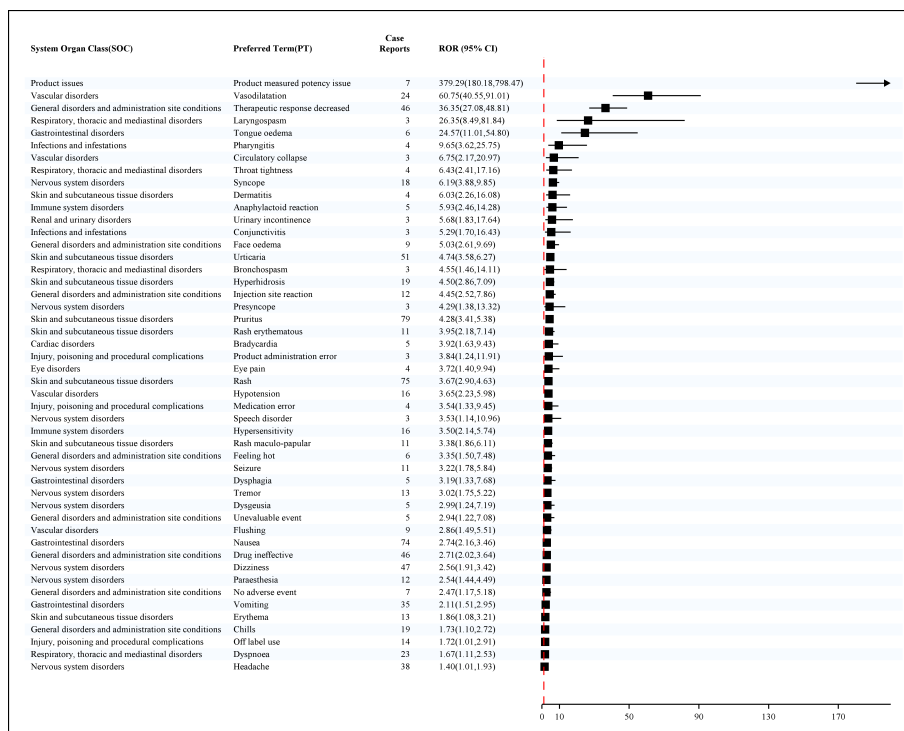


**Figure 2.** Proportion of adverse events by PTs



### 3.4. Forest plot of positive signal strength

A higher ROR value indicates a stronger association between a specific drug and a particular adverse event. A higher ROR value suggests that this adverse event is more common among patients using the drug, indicating a potential causal relationship. **Figure 3** illustrates the signal strength for various adverse reactions. The issue of product potency has the highest ROR value at 379.29 (95% CI: 180.18, 798.47), indicating a significant association between Technetium (Tc99m) Medronate and product potency issues. Vasodilatation (60.75, 95% CI: 45.91, 80.51) and decreased therapeutic response (36.35, 95% CI: 20.48, 64.81) also present significant positive signals, suggesting a high risk of association with Technetium (Tc99m) Medronate in these areas. Other notable positive signals include laryngospasm (26.35, 95% CI: 9.81, 48.84), tongue edema (24.57, 95% CI: 11.04, 54.80), and pharyngitis (9.65, 95% CI: 2.25, 25.75), indicating that Technetium (Tc99m) Medronate may cause significant respiratory and oral-related issues. Circulatory collapse (6.72, 95% CI: 1.27, 20.97), throat tightness (6.43, 95% CI: 4.17, 11.16), syncope (6.19, 95% CI: 3.88, 9.85), and dermatitis (6.03, 95% CI: 2.86, 12.08) also demonstrate high ROR values, suggesting these symptoms are more pronounced when using Technetium (Tc99m) Medronate. For more common but lower ROR adverse reactions, including face edema (5.03, 95% CI: 2.61, 9.69), urticaria (4.74, 95% CI: 3.58, 6.27), bronchospasm (4.55, 95% CI: 1.64, 11.11), and hypotension (3.66, 95% CI: 2.23, 5.98), these adverse reactions, although lower in signal strength, still warrant attention. Other areas of concern include various nervous system, skin, and subcutaneous tissue-related symptoms, such as injection site reaction (4.45, 95% CI: 2.52, 7.86), pruritus (4.28, 95% CI: 3.41, 5.38), and drug ineffective (2.71, 95% CI: 2.03, 3.64), which also display notable positive signals. Overall, these data indicate that Technetium (Tc99m) Medronate may cause a range of systemic adverse reactions, particularly in areas such as product potency, vasodilatation, decreased therapeutic response, and respiratory and oral-related issues, which have higher ROR values, suggesting these are high-risk areas to monitor closely when using Technetium (Tc99m) Medronate. Close monitoring and early intervention for these adverse reactions are essential to ensure patient safety.



**Figure 3.** Forest plot of positive signal strength by ROR

### 3.5. Summary

This study, based on the VigAccess database, analyzed adverse events related to Technetium (Tc99m) Medronate and found that the number of reports from female patients was higher, with a significant proportion in the age group of 18 to 64 years. The related adverse events were mainly concentrated in skin and subcutaneous tissue diseases, general disorders and administration site reactions, and nervous system diseases. Adverse events such as product efficacy issues, vasodilation, and reduced therapeutic response were strongly associated with Technetium (Tc99m) Medronate.

## 4. Discussion

This analysis of Technetium (Tc99m) Medronate-related adverse events based on the VigAccess database provides valuable perspectives and data support for a deeper understanding of the safety profile of this drug in real-world use. From the basic characteristics of adverse event reports, the number of reports from female patients is significantly higher than that of males, accounting for nearly half. This gender difference may be related to multiple factors. On the one hand, in the populations suffering from diseases such as rheumatoid arthritis and osteoporosis, which Technetium (Tc99m) Medronate is commonly used to treat, the proportion of female patients is relatively higher <sup>[3]</sup>; thus, the number of female patients using Technetium (Tc99m) Medronate is naturally higher, leading to an increase in corresponding adverse reaction reports <sup>[4]</sup>. On the other hand, females may be more sensitive to drug reactions due to physiological characteristics such as hormonal changes, which may interact with the drug's metabolism and action process in the body, making adverse reaction symptoms more likely to appear and be reported <sup>[5]</sup>. Additionally, social and cultural factors may also play a role, as women are generally more attentive to their health and more inclined to seek medical attention and report discomfort during drug use, while men may have higher tolerance to body symptoms or delay medical reporting due to traditional beliefs. Regarding age distribution characteristics, the number of reports is higher in the age group of 18 to 64 years, especially in the 45 to 64 years age group, which aligns with the age profile of the primary indications for Technetium (Tc99m) Medronate, such as rheumatoid arthritis and osteoporosis, which are more common in middle-aged and elderly populations <sup>[6]</sup>. Therefore, this age group uses Technetium (Tc99m) Medronate more frequently, resulting in an increase in adverse reaction reports. The proportion of reports from the Americas is as high as 90.06%, far exceeding other regions <sup>[7]</sup>. This phenomenon may suggest that Technetium (Tc99m) Medronate is more widely used in the Americas, possibly related to the local medical market's recognition of the drug, the distribution of medical resources, and the characteristics of the disease spectrum. It may also reflect that the adverse drug reaction monitoring system in this region is relatively more complete and mature, encouraging healthcare professionals and patients to actively report adverse events, making the relevant data more fully collected and presented. From the trend of report years, early reports were fewer, gradually increasing after 2000, with a small peak in 2006. This may be related to the widespread clinical application of Technetium (Tc99m) Medronate over time, increasing awareness among doctors and patients, and the gradual enhancement of adverse drug reaction monitoring awareness, leading to more adverse reactions being discovered and reported.

In the classification of adverse events by system organ class, skin and subcutaneous tissue diseases, general disorders and administration site reactions, and nervous system diseases have higher proportions <sup>[8]</sup>. Common skin reactions such as itching, rash, and urticaria may be related to Technetium (Tc99m) Medronate as a radionuclide drug, whose unique pharmacological mechanism may affect the physiological state of the skin to some extent,

stimulating immune responses or causing allergic reactions <sup>[9]</sup>. The prominence of general disorders and administration site reactions suggests that the drug may interfere with the body's overall metabolism and immune functions after entering the body, and local administration sites may develop inflammation due to drug irritation. The high proportion of nervous system adverse events is also noteworthy, as the complexity and importance of nervous system functions mean that such adverse reactions could significantly impact patients' quality of life and health <sup>[10]</sup>. Technetium (Tc99m) Medronate may cause symptoms like headache and dizziness by affecting neurotransmitter levels, nerve cell metabolism, or directly acting on nerve tissues, and the specific mechanisms require further in-depth research.

From the ROR positive signal analysis results, the product efficacy issue has an extremely high ROR value, which may indicate that in actual use, Technetium (Tc99m) Medronate has certain efficacy instability or does not meet expectations <sup>[5,7]</sup>. The influencing factors may be multifaceted, such as quality control fluctuations in drug production, substandard storage, and transportation conditions affecting drug efficacy, and individual differences in patients affecting drug absorption and utilization. High signal strengths for vasodilation and reduced therapeutic response suggest that we need to re-examine whether there are areas for improvement in Technetium (Tc99m) Medronate's drug development, clinical application guidance, and patient education to optimize its clinical efficacy and safety <sup>[8]</sup>. Significant positive signals for respiratory and oral issues like throat spasm and tongue edema also warn that corresponding symptoms and signs should be closely monitored when using Technetium (Tc99m) Medronate, with preventive and responsive measures taken in advance to avoid severe adverse events.

However, this study also has some limitations. Firstly, the data in the VigAccess database are from voluntary reports from various countries, which may lead to reporting bias, such as more severe adverse events being more likely to be reported while minor events might be overlooked, resulting in data not entirely accurately reflecting the actual situation. Secondly, the level of detail in the database is limited, and some reports may lack complete patient basic information, medication history, and comorbidities, which to some extent affects the accurate judgment and in-depth analysis of the causal relationship between adverse events and Technetium (Tc99m) Medronate. Furthermore, this study only conducted statistical analysis based on existing data without further clinical validation trials, so the potential signals and mechanisms discovered still require more experimental research and clinical observations to confirm.

## 5. Conclusion

In summary, this study revealed the characteristics, distribution patterns, and potential risk signals of adverse reactions to Technetium (Tc99m) Medronate in real-world use by thoroughly mining the Technetium (Tc99m) Medronate-related adverse event information in the VigAccess database. It provides important references for clinicians to use Technetium (Tc99m) Medronate rationally, enhance medication monitoring, and for pharmaceutical companies to improve product quality. It also points the way for further safety research on Technetium (Tc99m) Medronate in the future, helping to continuously improve its pharmacovigilance system, ensuring patient medication safety, and promoting its better role in clinical treatment.

## Disclosure statement

The authors declare no conflict of interest

## References

- [1] Shen S, Wang W, Yang C, et al., 2019, Effect of Technetium-99 Conjugated with Methylene Diphosphonate (99Tc-MDP) on OPG/RANKL/RANK System In Vitro. *J Oral Pathol Med*, 48(2): 129–135.
- [2] Shi L, Ning Y, Xu L, et al., 2018, Technetium-99 Conjugated with Methylene Diphosphonate Ameliorates Glucocorticoid Induced Osteoporosis by Inhibiting Osteoclastogenesis. *Biomed Res Int*, 2018: 7902760.
- [3] Fu Q, Feng P, Sun LY, et al., 2021, A Double-Blind, Double-Dummy, Randomized Controlled, Multicenter Trial of 99Tc-Methylene Diphosphonate in Patients with Moderate to Severe Rheumatoid Arthritis. *Chin Med J (Engl)*, 134(12): 1457–1464.
- [4] Li Y, Cai M, Zhang R, et al., 2021, Investigating the Preventive Effects of 99Tc-Methylenediphosphonate on a Glucocorticoid-Induced Osteoporosis Rabbit Model. *Curr Top Med Chem*, 21(26): 2425–2433.
- [5] Deng G, Chen X, Shao L, et al., 2023, Effectiveness and Safety of 99Tc-Methylene Diphosphonate as a Disease-Modifying Anti-Rheumatic Drug (DMARD) in Combination with Conventional Synthetic (cs) DMARDs in the Treatment of Rheumatoid Arthritis: A Systematic Review and Meta-Analysis of 34 Randomized Controlled Trials. *Heliyon*, 9(11): e21691.
- [6] Xie J, Yuan X, Mao W, et al., 2022, 99Tc-Methylene Diphosphonate Treatment is Safe and Efficacious for Osteoporosis in Postmenopausal Differentiated Thyroid Cancer Patients Undergoing TSH Suppression: A Three-Center Non-Randomized Clinical Study. *Cancer Manag Res*, 14: 995–1005.
- [7] Xu Y, Zhong Y, Zhao M, et al., 2018, Effects and Safety of 99Tc-MDP in Patients with Refractory Ankylosing Spondylitis: A 2-Stage (30-Week Follow-Up) Clinical Trial. *Clin Exp Rheumatol*, 36(3): 396–404.
- [8] Liu H, Guo H, Guo S, et al., 2019, Novel Treatment of 99Tc-MDP Improves Clinical and Radiographic Results for Patients with Osteochondral Lesions of the Talus. *Q J Nucl Med Mol Imaging*, 63(2): 199–206.
- [9] Chen J, Lan Y, He Y, et al., 2017, 99Tc-MDP-Induced Human Osteoblast Proliferation, Differentiation and Expression of Osteoprotegerin. *Mol Med Rep*, 16(2): 1801–1809.
- [10] Huang Z, Chen C, Tan L, et al., 2024, 16S rRNA Gene Sequencing of Gut Microbiota in Rheumatoid Arthritis Treated with 99Tc-MDP. *Pharmgenomics Pers Med*, 17: 237–249.

### Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.





## Integrated Services Platform of International Scientific Cooperation

Innoscience Research (Malaysia), which is global market oriented, was founded in 2016. Innoscience Research focuses on services based on scientific research. By cooperating with universities and scientific institutes all over the world, it performs medical researches to benefit human beings and promotes the interdisciplinary and international exchanges among researchers.

Innoscience Research covers biology, chemistry, physics and many other disciplines. It mainly focuses on the improvement of human health. It aims to promote the cooperation, exploration and exchange among researchers from different countries. By establishing platforms, Innoscience integrates the demands from different fields to realize the combination of clinical research and basic research and to accelerate and deepen the international scientific cooperation.

### Cooperation Mode



Clinical Workers



In-service Doctors



Foreign Researchers



Hospital



University



Scientific institutions

# OUR JOURNALS



The *Journal of Architectural Research and Development* is an international peer-reviewed and open access journal which is devoted to establish a bridge between theory and practice in the fields of architectural and design research, urban planning and built environment research.

Topics covered but not limited to:

- Architectural design
- Architectural technology, including new technologies and energy saving technologies
- Architectural practice
- Urban planning
- Impacts of architecture on environment

*Journal of Clinical and Nursing Research (JCNR)* is an international, peer reviewed and open access journal that seeks to promote the development and exchange of knowledge which is directly relevant to all clinical and nursing research and practice. Articles which explore the meaning, prevention, treatment, outcome and impact of a high standard clinical and nursing practice and discipline are encouraged to be submitted as original article, review, case report, short communication and letters.

Topics covered by not limited to:

- Development of clinical and nursing research, evaluation, evidence-based practice and scientific enquiry
- Patients and family experiences of health care
- Clinical and nursing research to enhance patient safety and reduce harm to patients
- Ethics
- Clinical and Nursing history
- Medicine



*Journal of Electronic Research and Application* is an international, peer-reviewed and open access journal which publishes original articles, reviews, short communications, case studies and letters in the field of electronic research and application.

Topics covered but not limited to:

- Automation
- Circuit Analysis and Application
- Electric and Electronic Measurement Systems
- Electrical Engineering
- Electronic Materials
- Electronics and Communications Engineering
- Power Systems and Power Electronics
- Signal Processing
- Telecommunications Engineering
- Wireless and Mobile Communication

