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ORIGINAL ARTICLE

EVALUATION OF KURDISH VERSION OF THE PATIENT-RATED WRIST/ HAND EVALUATION

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ABSTRACT

Background: For upper extremity (hand and wrist) injuries, patient rated self-evaluation tools are increasing worldwide. This study aimed to evaluate the reliability, validity, and responsiveness of the Kurdish translation of patient-rated hand/wrist evaluation (PRWHE-K).

Materials & Methods: This cross-sectional study was done from April to October 2022 in public medical center Sulaymaniyah, Iraq. Cross-cultural adaptation of PRWHE-K was performed by a five-step approach using the translation and back-translation method. PRWHE-K was completed during two occasions within a 24-hour interval. All analyses were performed in MedCalc statistical software version 20.2. Reliability, validity and responsiveness were assessed to evaluate cross-cultural adaptation of PRWEH-K questionnaire.

Results: There were total 300 participants in this study. Internal consistency PRWEH-K total score (Cronbach's alpha = 0.99) and test-retest reliability (interclass correlation coefficient =0.99) were excellent. Concordance correlation coefficient (CC=0.99) of PRWEH-K total score showed a strong correlation and concordance between the two measures. Strong correlation between PRWHE-K and DASH score in the first (r=0.793) and second (r=0.792) measures demonstrated good construct validity of PRWHE-K. No ceiling or floor effects were detected (0.0%). The effect size and standardized response mean of PRWEH-K total score was -0.003 and -0.174, respectively. Standard error of measurement, minimal detectable change at 90% confidence level, and minimal detectable change at 95% confidence level were 0.151, 0.351, and 0.688, respectively.

Conclusion: PRWHE-K is a reliable and valid tool to clinical assessment of upper extremity injuries in terms of perceived pain and pertaining physical impairments. Our results also highlight the importance of further evaluations of the PRWHE-K outcome measure to confirm its utility in different clinical settings.

KEY WORDS: Patient; Hand; Wrist evaluation; Tools; Validity; Reliability.

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INTRODUCTION

Recent literature has shown a global increase in the number of medical visits due to upper extremity injuries,[1-4] that requires admission to the hospital. Based on a global burden of disease study done in 2017, high socio-demographic-indexed (SDI) countries face a 25% increase in upper extremity fractures and amputations.[5, 6] Some studies have shown a poor correlation between the functional outcome of patients and the radiological findings of their hand and wrist injuries.[7, 8] As a result, patient-rated questionnaires have received a considerable amount of attention since it gives a better understanding of a patients' perspectives on the outcome of injuries and subsequent physical impairments.[9]

In particular, patient-rated hand/wrist evaluation (PRWHE) exhibited notable reliability and validity in outcome measurements of pain and disability among different injuries of the hand.[10] PRWHE is 15-item self-report questionnaire compromise 10-item functional subscale (6-item specific function assessment and 4-item usual function assessment) and 5-item pain subscale. Each item scored between 0 to 10 points, where 10 is worst score. Overall score was calculated by sum of pain score plus half of function score. As a result, the overall score of the PRWHE ranges from 0 to 100.

Several studies have evaluated the practicality of PRWHE's when translated to another language taking into account unique cultural and linguistic features.[10-12] These studies demonstrated that the translated versions of PRWHE had excellent internal consistency,

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reliability, construct validity and measurement error when compared to other scales such as Disability of Arm, Shoulder and Hand (DASH) scale.[13] However, the quality evidence available is of low and there is also a need to translate PRWHE questionnaire into other languages. Although, there is modest evidence for upper extremity injuries in low- and middle-income countries, a clear image of the relevant incidence and outcomes remains in debate.[14] Consequently, we aimed to evaluate the reliability, validity, and responsiveness of the Kurdish translation of PRWHE (PRWHE-K) and its subscales in Kurdistan, Iraq.

MATERIALS AND METHODS

In this cross-sectional study 338 participants were recruited from April to October 2022. We excluded 38 questionnaires from the analysis because of the incomplete answering of the tool items. Prior to subject recruitment, ethics approval was obtained from Sulaymaniyah University Research Ethics Board (Ethical code: 7/29-4758 on April 18th 2022). Informed consent was taken from all participants before initiating data gathering. The research adhered to principles of Helsinki declaration after achieving a written permission from the original author.

Cross cultural translation of PRWHE to Kurdish version was performed according to Beaton et al. (15) proposed method. For this purpose, we adhered the following steps:

- At first, two independent translators translated the original version of PRWEH to Kurdish. One of the two translator were professional translator and the other was medical professional. The two translated versions of the PRWHE were compared in detail and disagreements were resolved with a discussion from a third researcher. An edited version of the PRWHE-K was produced after all discrepancies were removed.
- Back-translation of the edited version of PRWHE-K was done by two bilingual linguistics experts living in Sulaymaniyah, Iraq. Inconsistencies between back translated version of PRWHE-K and original PRWEHE was assessed during this step.
- We performed some modifications to the items to improve cross cultural understanding of the questionnaire.
- In the next step, the modified version of PRWHE-K was re-evaluated, and the pre-final version of questioner was provided for assessment of psychometric properties. The re-evaluation step was done by an expert committee consisting of our research team, a methodologists, translators, and linguistic experts.
- Finally, we perform a cognitive face-to-face interview for the assessment of self-report performance of the PRWHE-K. Ten volunteers (7 female and 3 male) with different hand injuries were interviewed. The answers of volunteers and their response for all items of PRWHE-K questioner was evaluated and discussed by the interviewer.

Potential participants with a variety of wrist/hand injuries were recruited from Shahid Saifaddin consultation clinic, a government funded medical center in Sulaymaniyah, where the national language is Kurdish. Patient with age>18 years old, wrist/hand disability, and primary school educated were included. Any cognitive, linguistic or vision impairments was considered as the exclusion criteria. The Self-report PRWHE-K questionnaire was completed by each participant during two occasions within a 24 hours interval. The reason for selecting a time interval of 24 hours was based on previous studies.[11]Since the nature of most wrist injuries are acute, choosing a time interval of 24 hours made the most sense for an acute injury. Only the completed questionnaires (no more than four questions in functional subscale and no more than two questions in pain subscale unanswered) were included in the analysis. The researchers were present at the time of completing the questionnaire and answered/assisted the volunteers with any questions regarding the components/completing of the questionnaire.

The sample size was calculated based on the hypothesis that the test-retest reliability of the questionnaire is 0.90. Considering alpha of 5%, beta of 90% and considering the dropout rate of 20%, the required sample size was considered to be about 60 patients. All analyses were performed in MedCalc statistical software version 20.2. Reliability, validity and responsiveness was assessed to evaluate cross-cultural adaptation of PRWEH-K questionnaire.

We calculated Cronbach alpha, intraclass correlation coefficient (ICC), and Kappa statistics to assessed test-retest reliability. Validity of the PRWEH-K was assessed by evaluating Pearson correlation test of first and second assessment of the PRWEH-K score and DASH score, concordance correlation coefficient (CCC; for criterion validity), and ceiling and floor effect. For total PRWEH-K score and functional subscale ceiling and floor effects was considered as score higher than 90 and lower than 10. In pain subscale these cut-offs were 45 and 5.

Responsiveness of the PRWEH-K was measured by assessment of effect size and standardized response means (SRM). The effect size and SRM reflect the ability of the questionnaire to detect the amount of improvement obtained as a result of treatment. Since the time interval between the first and the second assessment of PRWEH-K is 24 hours, it is not expected to obtain a large effect size and SRM in the present study. Standard error in measurement (SEM) is another statistic to evaluate responsiveness. SEM distinguishes true changes in clinical status

of patients from an error in measurements during follow up period. Therefore, we calculated minimal detectable change (MDC) with a confidence interval of 95% (MDC95) and 90% (MDC90).

RESULTS

A sample of 300 participants (203 females and 97 males) were included. The mean age of patients was 45.18 ±13.48 years and the majorities were urban residents (70%), rests of the demographic characteristics are shown in Table 1.

The mean total score of PRWEH was 43.16 ±15.09 in the first and 43.12 ±15.07 in the second assessment (Mean difference: 0.04 ± 0.24). As subscales of the total function score (45.74 ±16.62 in the first and 45.71 ±16.60 in the second assessment), the specific function score (27.34 ±11.49 in the first and 27.31 ±11.48 in the second assessment) and the usual function score (18.41 ±6.11 and 18.40 ±6.10 in the first and second assessments, respectively) were addressed. The score of the pain subscale was 20.28 ±7.44 in the first and 20.26 ±7.43 in the second assessment. All subscale scores minimally changed the second assessment (Table 2). Reliability, Validity and Responsiveness are shown in Table: 3. PRWHE-K display the excellent agreement among test- retest occasions (Figure 1).

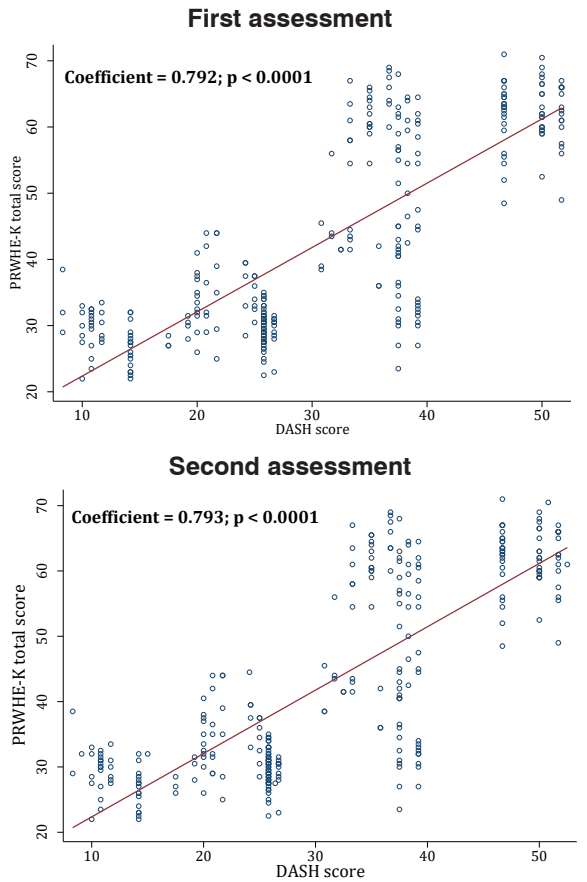

Figure 1: Pearson correlation of PRWHE-K and DASH

Table 1: Demographic characteristics of included subjects

Characteristics	Value
Number of patients	300
Age (mean ± SD; year)	45.18 ± 13.48
Gender (n, %)	
Female	203 (67.67)
Male	97 (32.33)
Educational status (n, %)	
Non-academic	266 (88.67)
Academic	34 (11.33)
Occupation (n, %)	
Employed	183 (61.0)
Un-employed	117 (39.0)
Residency status (n, %)	
Urban	210 (70.0)
Rural	90 (30.0)
Smoking status (n, %)	
Smoker	53 (17.67)
Non-smoker	247 (82.33)
Involved Region side (n, %)	
Right	167 (55.67)
Left	133 (44.33)
Dominant hand (n, %)	
Right	260 (86.67)
Left	40 (13.33)
Involved region of body (n, %)	
Shoulder	18 (6.0)
Arm	12 (4.0)
Elbow	21 (7.0)
Forearm	62 (20.67)
Wrist	132 (44.0)
Hand	55 (18.33)
Duration of presence of symptoms (mean ± SD; weeks)	15.69 ± 7.10
Diagnosis (n, %)	
Frozen shoulder	18 (6)
Tennis elbow	11 (3.67)
Trigger digits	25 (8.33)
Wrist tenosynovitis	12 (4)
Humerus fracture	12 (4)
Radius fracture	62 (20.67)
Scaphoid fracture	27 (9)
Phalangeal fracture	30 (10)
Carpal tunnel syndrome	93 (31)
Ulnar nerve entrapment at elbow	10 (3.33)

SD: Standard deviation

Table 2: Total score of PRWEH in the first assessment and follow up

PRWEH	First assessment	Second assessment	Mean difference
Total score	43.16 ± 15.09	43.12 ± 15.07	0.04 ± 0.24
Specific function score	27.34 ± 11.49	27.31 ± 11.48	0.03 ± 0.20
Usual function score	18.41 ± 6.11	18.40 ± 6.10	0.01 ± 0.19
Total function score	45.74 ± 16.62	45.71 ± 16.60	0.04 ± 0.27
Pain score	20.28 ± 7.44	20.26 ± 7.43	0.02 ± 0.19
Time needed to complete (min)	3.62 ± 0.81	3.37 ± 0.68	0.25 ± 0.68

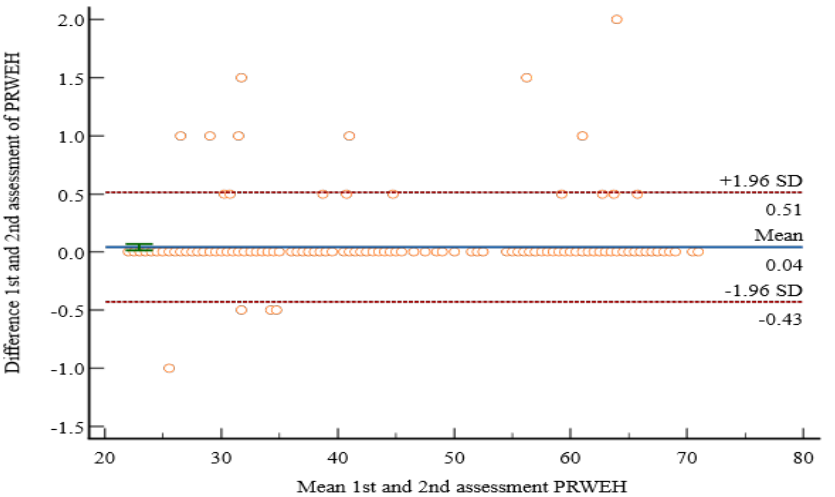

Figure 2: The agreement between PRWHE-K scores on first and the second assessment.

Table 3: Psychometric properties of Kurdish version of PRWEH

Properties	Value (95% CI)
PRWHE-K Total score	
Reliability	
Cronbach alpha	0.9999
ICC	0.9999 (0.9999 to 0.9999)
Kappa	0.996 (0.994 to 0.998)
Validity	
Ceiling effect	0%
Floor effect	0%
CCC	0.9999 (0.9998 to 0.9999)
Responsiveness	
Effect size	-0.003 (-0.005 to -0.001)
SRM	-0.174 (-0.248 to -0.080)
Ability to detect changes	
SEM	0.151
MDC 90	0.351
MDC95	0.688

Properties	Value (95% CI)
Specific function score	
Reliability	
Cronbach alpha	0.9999
ICC	0.9999 (0.9999 to 0.9999)
Kappa	0.997 (0.995 to 0.999)
Validity	
Ceiling effect	0%
Floor effect	0%
CCC	0.9998 (0.9998 to 0.9999)
Responsiveness	
Effect size	-0.002 (-0.004 to -0.0006)
SRM	-0.134 (-0.206 to -0.008)
Ability to detect changes	
SEM	0.115
MDC 90	0.267
MDC95	0.524

Properties	Value (95% CI)
Usual function score	
Reliability	
Cronbach alpha	0.9998
ICC	0.9998 (0.9997 to 0.9998)
Kappa	0.998 (0.994 to 1.0)
Validity	
Ceiling effect	0%
Floor effect	0%
CCC	0.9995 (0.9994 to 0.9996)
Responsiveness	
Effect size	-0.002(-0.008 to 0.0006)
SRM	-0.052 (-0.116 to 0.0818)
Ability to detect changes	
SEM	0.0864
MDC 90	0.201
MDC95	0.394
Total function score	
Reliability	
Cronbach alpha	0.9999
ICC	0.9999 (0.9999 to 0.9999)
Kappa	0.997 (0.995 to 0.999)
Validity	
Ceiling effect	0%
Floor effect	0%
CCC	0.9999 (0.9998 to 0.9999)
Responsiveness	
Effect size	-0.002 (-0.005 to -0.0006)
SRM	-0.133 (-0.208 to -0.018)
Ability to detect changes	
SEM	0.166
MDC 90	0.386
MDC95	0.757
Pain score	
Reliability	
Cronbach alpha	0.9998
ICC	0.999 (0.9998 to 0.9999)
Kappa	0.996 (0.994 to 0.999)
Validity	
Ceiling effect	0%
Floor effect	0%
CCC	0.9997 (0.9996 to 0.9997)
Responsiveness	
Effect size	-0.003 (-0.007 to -0.0009)
SRM	-0.123 (-0.194 to -0.0218)
Ability to detect changes	
SEM	0.074
MDC 90	0.173
MDC95	0.339

CCC: Concordance correlation coefficient

DISCUSSION

In this cross-sectional study, we successfully evaluated PRWHE-K cross-culturally for the Kurdistan region of Iraq and evaluated the reliability, validity, and responsiveness of the translated version of PRWHE-K in this area. Also the results were consistent with previous studies in other linguistically unique regions of the world, [13] confirming the usefulness of PRWHE-K in the outcome assessment of upper extremity injuries.

To illustrate this more, reliability refers to the consistency of the results in the same setting and subjects each time a measurement tool is used. In order to assess reliability, we calculated Cronbach's alpha, ICC, and Kappa, in which values closer to one indicated higher reliability. The validity on the other hand shows the ability of each tool to test precisely what they are supposed to. Thus, we calculated Pearson's rho and CCC (results closer to one showed higher validity) to show a constant linear correlation between the two measures. Also, the ceiling and floor effects were included to rule out the possibility of results being dispersed in the two ends of the PRWHE-K results spectrum (values less than 10 percent are optimal). Responsiveness refers to a test's ability to detect clinically important changes, and ES and SRM were estimated for this purpose. Additionally, SEM, MDC_{90}, and MDC_{95} were calculated to test if the intended tool is able to detect the least clinically significant change.

Test-retest reliability of PRWHE-K was excellent in our study since its ICC and Kappa statistic is very close to 1. Hasani et al. by cross-cultural adaptation of Arabic version of PRWHE reported an ICC of 0.97.[11] In another work Rosales et al.[10]depicted a 0.94 to 0.96 ICC of Spanish version of PRWHE and in the Mellstrand Navarro et al.[16]study the ICC was reported 0.93 for total score. Although there are some heterogeneities among the mentioned studies, it seems that translated version of PRWHE has excellent test-retest reliability. However, reliability of Hindi version of PRWHE was reported lower than other translated version (ICC=0.81).[12]Although a

systematic review and meta-analysis confirmed the excellent internal consistency and reliability of translated versions of PRWHE compared to DASH scale, the available quality of evidence is low,[13] which emphasis the importance of further cross-cultural adaptation of PRWHE to different languages.

Construct validity of PRWHE-K was assessed by its correlation with DASH score. Pearson coefficient of PRWHE-K was significant and demonstrated acceptable construct validity. In this regards Fonseca et al. demonstrated a correlation coefficient of 0.83 between PRWHE and DASH.[17] In another work van Gorp et al. depicted good correlation of Dutch version of PRWHE and Quick DASH ($r = 0.85$). Moreover, Ozturk et al. reported that good to excellent correlation coefficient of PRWHE and DASH.[18] It seems that the translated versions of PRWHE have acceptable construct validity in other published papers.[19-22]

We calculated effect size and SRM to evaluate the responsiveness of PRWHE-K. Our results showed a relatively small effect size and SRM. A possible explanation for this is the 24-hour time interval between first and second measurements. Longer follow-ups are needed to observe clinically significant improvements in the performance following upper extremity injuries, therefore, the observed improvement rate among the included patients is low, and for this reason, the PRWHE-K has reported a low effect size and SRM. This explanation was supported by MDC values since the observed mean difference of PRWHE-K total score in our study in two measurements is considerably lower than MDC90 and MDC95.

Therefore, the short time interval to re-test each participant was the main limitation and a possible source of disparity in the results of our study compared to those conducted previously. We tested our patients for the second time in the first 24 hours after the initial encounter and a bias is expectable since there is a possibility that patients could recall their prior answers. Also, the relatively short interval to the second assessment eventually disregards the impact of treatment on the final outcome.

CONCLUSION

PRWHE-K is a reliable and valid instrument to evaluate upper extremity injuries in terms of perceived pain and pertaining physical impairments. Our results highlight the need for further evaluations of PRWHE-K to confirm its usefulness in different clinical settings.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	RAH, OARB
Acquisition, Analysis or Interpretation of Data:	RAH, OARB, JAH
Manuscript Writing & Approval:	RAH, OARB, JAH

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.