Journal of the Formosan Medical Association (2013) 112, 332–337

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.jfma-online.com

ORIGINAL ARTICLE

The test–retest reliability and the minimal detectable change of the Purdue pegboard test in schizophrenia

Posen Lee [a], Chin-Hsuan Liu [b], Chia-Wei Fan [c], Chi-Pang Lu [c], Wen-Shian Lu [d,e,*], Ching-Lin Hsieh [c,f]

[a] *Department of Occupational Therapy, I-Shou University, Kaohsiung, Taiwan*
[b] *Department of Occupational Rehabilitation, Kai-Suan Psychiatric Hospital, Kaohsiung, Taiwan*
[c] *School of Occupational Therapy, College of Medicine, National Taiwan University, Taipei, Taiwan*
[d] *School of Occupational Therapy, Chung Shan Medical University, Taichung, Taiwan*
[e] *Occupational Therapy Room, Chung Shan Medical University Hospital, Taichung, Taiwan*
[f] *Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, Taipei, Taiwan*

Received 9 September 2010; received in revised form 16 February 2012; accepted 17 February 2012

KEYWORDS
hand;
psychometrics;
Purdue pegboard test;
reproducibility of results;
schizophrenia

Background/Purpose: The Purdue pegboard test is widely used in measuring the hand dexterity of patients with schizophrenia. In patients with schizophrenia, the test–retest reliability and minimal detectable change (MDC) of this test remain largely unknown, limiting the interpretability of this popular measure. The purpose of this study was to estimate the test–retest reliability and the MDC of the Purdue pegboard test for patients with schizophrenia.

Methods: A total of 147 patients with schizophrenia participated in this study. The participants were administrated the five subtests of the Purdue pegboard test, three trials in a row at both of the two sessions 1 week apart. The intraclass correlation coefficient (ICC) was used to examine the test–retest reliability and the MDC was calculated on the basis of standard error of measurement.

Results: The test–retest reliabilities of the five subtests were moderate to good (ICC = 0.73–0.88). The MDC (MDC%) was 3.0 (22.9%) for the dominant hand subtest, 3.1 (26.1%) for the nondominant hand subtest, 3.0 (31.7%) for the both hands subtest, 6.1 (17.7%) for the dominant + nondominant + both hands subtest, and 8.5 (35.3%) for the assembly subtest.

Conclusion: Our results reveal that the Purdue pegboard test has moderate-to-good test–retest reliability but substantial random measurement error. These findings should

* Corresponding author. School of Occupational Therapy, Chung Shan Medical University, No. 110, Section 1, Jianguo North Road, Taichung City 40201, Taiwan.
E-mail address: wslu@csmu.edu.tw (W.-S. Lu).

doi:10.1016/j.jfma.2012.02.023

enable clinicians and researchers to monitor and interpret the changes in the hand dexterity of patients with schizophrenia more accurately and confidently.

Introduction

By doing everyday tasks with his/her hands, a person can gain competence and master his/her desired and expected roles in life.[1] Hand dexterity deficits are common in patients with schizophrenia.[2] Dexterity deficits often limit or restrict the individual's capacity to complete daily life tasks effectively and efficiently.[3] In the investigation of the effects of treatments for patients with schizophrenia, hand dexterity is usually an important indicator because of its close relevance to executive function and impact on social function.[4] Hand dexterity also influences employment outcomes for patients with schizophrenia.[5] Clinicians assess the hand dexterity of patients with schizophrenia periodically to revise treatment programs in order to improve the patients' ability to perform in their occupations. Thus, a reliable instrument is crucial in measuring hand dexterity function in patients with schizophrenia to monitor the effects of intervention in both clinical and research settings.

To examine the reliability of a measure, the test–retest reliability can be calculated by the extent of agreement and reproducibility between two repeated measurements.[6] The minimal detectable change (MDC) is defined as the minimal threshold beyond the random measurement error with a 95% confidence level.[7] Namely, MDC (absolute value) indicates the minimal magnitude of change beyond which the change is likely to be real, rather than due to random measurement error. Both clinicians and researchers can use the MDC as a threshold to judge whether a change in an individual patient on a certain measure referring to a specific characteristic signifies real improvement (or deterioration). Thus, the MDC is critical in interpreting individual changes in successive measurements in both clinical and research settings.

The test–retest reliability of the Purdue pegboard test has been examined in healthy persons and persons diagnosed with multiple sclerosis, rheumatoid arthritis, and mental retardation.[8–12] However, the test–retest reliability and the MDC of the Purdue pegboard test when administered to patients with schizophrenia have not been examined and thus remain largely unknown. Because psychometric properties (e.g., test–retest reliability) are sample dependent,[13,14] such a shortcoming of the Purdue pegboard test limits the measure's utility and interpretability for patients with schizophrenia.

The purpose of this study was to examine the test–retest reliability and the MDC of the five subtests of the Purdue pegboard test in patients with schizophrenia.

Methods

Participants

Participants were recruited from a chronic ward of a clinical psychiatric center in southern Taiwan. The eligible participants met the following criteria: (1) diagnosis of schizophrenia according to the Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (DSM-IV) criteria, excluding schizoaffective disorder; (2) stable and consistent dose of antipsychotic medication for at least 1 month prior to the study; (3) ability to follow instructions; and (4) absence of substance abuse or other neurological deficits such as dementia, mental retardation, or developmental disability. All participants gave informed consent prior to their inclusion in this study and were assigned identification numbers to maintain anonymity. Data were collected from February 2009 to May 2009. The study protocol was reviewed and approved by the Institutional Review Board of Kai-Suan Psychiatric Hospital.

Procedures

The Purdue pegboard test was administered at two sessions 1 week apart by a trained occupational therapist. All participants completed three trials per session. The therapist followed the standard procedure and gave the instructions according to the Purdue pegboard test manual. The test was administered by group, and each group comprised no more than five patients. Participants' demographic characteristics were collected from medical charts.

Instrument

The Purdue pegboard test, which has good predictive and concurrent validity,[15,16] consists of five subtests: dominant (D) hand, nondominant (ND) hand, both (B) hands, dominant + nondominant + both (D + ND + B) hands, and assembly subtest. On a Purdue pegboard, each of the extreme right- and left-side cups contains 25 pins. For right-handed participants, the cup next to the extreme right cup contains 20 collars, and the cup next to the extreme left cup contains 40 washers; this arrangement is reversed for left-handed participants. The test can be administrated either individually or by group. In the D hand and ND hand subtests, participants are instructed to place as many pins as possible in the holes in 30 seconds. In the B hands subtest, participants use the D and ND hands simultaneously to place the pins in both holes in 30 seconds. In the assembly subtest, participants pick up and place pins, washers, and collars, using alternative hands, for 60 seconds. The number of pins placed in the pegboard within the time limit represents the scores for the D hand and ND hand subtests, and the pairs of pins for the B hands subtest. The sum of scores of the three subtests represents the score for the D + ND + B hands subtest. The number of pieces assembled completely (containing pin, washer, collar, and second washer) represents the score of the assembly subtest.[17]

Statistical analysis

The mean scores of the three trials in each session of the five subtests were computed for the test and retest