Psychometric Properties of the Balance Evaluation Systems Test (BESTest), the Mini-Balance Evaluation Systems Test (Mini-BESTest) and the Brief Balance Evaluation Systems Test (Brief-BESTest) in Patie Chan ACM(1), Pang MYC(2)
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Keywords:
Total Knee Arthroplasty
Psychometric Properties
Balance

Introduction
Total Knee Arthroplasty (TKA) has become a common surgical intervention in the treatment of severe osteoarthritis (OA) of knee joint. Scientific evidences support the use of TKA for correction of deformity, mitigation of pain, amelioration of physical function and symptoms of OA. However, patients with TKA often sustain balance deficits, leading to a higher fall rate than the reference elderly population. Hence, understanding balance problems in patients after TKA is important. The Balance Evaluation Systems Test (BESTest) is a relatively new clinical examination for balance impairment. More recently, the Mini-Balance Evaluation Systems Test (Mini-BESTest) and the Brief Balance Evaluation Systems Test (Brief BESTest), which are shortened versions of the BESTest, have been developed. Yet their psychometric properties have not been specifically tested in patients with TKA.

Objectives
To examine the psychometric properties of the BESTest, Mini-BESTest and Brief-BESTest in patients with TKA.

Methodology
This was an observational measurement study with a test-retest design. Forty-six patients with TKA participated in the reliability assessment. Intrarater reliability was evaluated by repeating the BESTest, Mini-BESTest and Brief-BESTest within one week by the same rater. The three BESTests were also administered by 3 independent raters to establish interrater reliability. Assessment of validity was done in another 46 patients with TKA by correlating the three BESTests with other balance-related measures (Activities-specific Balance Confidence Scale (ABC) and
The Berg Balance Scale (BBS). The floor and ceiling effects were also examined.

**Result**

The BESTest, Mini-BESTest and Brief-BESTest had excellent internal consistency (Crobach’s alpha=0.963-0.999), intrarater reliability [ICC(3,1)=.929-.964] and interrater reliability [ICC(2,1)=.968-.998]. The three BESTests also showed moderate to high correlations with ABC and BBS (Pearson’s r=.347-.782), thus demonstrating good construct validity. In terms of floor and ceiling effects, the three BESTests were significantly less skewed than the BBS (p<.001). The results are generalizable only to patients who have TKA surgery because of end-stage osteoarthritis at the knee. The BESTest, Mini-BESTest and Brief-BESTest are reliable and valid tools for evaluating balance in patients with TKA. While the three BESTests have comparable psychometric properties, the Brief-BESTest is least time consuming and may be more useful clinically.